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Smart Moves

Creative Supply Chain Strategies Are Cutting Transport Costs and Emissions

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Introduction

Thanks to persistently high diesel costs, along with corporate commitments to improve supply chain sustainability and curtail heat-trapping carbon emissions, commercial shippers across the United States are devising innovative and increasingly creative new strategies to move goods more efficiently, at lower cost, and with smaller environmental footprints.

These solutions go beyond asking carriers to make improvements such as reducing vehicle speeds or improving aerodynamics. They involve actions directly under the control of the shippers. These solutions are being unlocked with unconventional thinking, and by breaking down traditional silos both between and within companies. Those that are willing and able to look beyond the usual tools are racking up big savings as a result.

The global flow of goods provides society with a greater selection of products at lower prices than ever before. But they represent significant cost centers for shippers faced with high oil prices and lean margins. Moving freight also carries a significant environmental footprint, one that increasingly runs counter to shippers' public environmental and sustainability goals.

All told, the global freight transportation and distribution system accounts for nearly three billion metric tons of heat-trapping carbon emissions each year.[1] That's equal to over 700 coal plants[2] or the combined total global warming pollution from Japan, Germany, Canada and Mexico.[3] Transportation accounts for 89 percent of the environmental footprint of supply chain logistics; warehousing and distribution take up the remaining 11 percent.[4]

Global freight emissions are growing rapidly as a result of increased demands for goods and services. In the United States alone, emissions from freight are projected to increase 74 percent from 2005 to 2035.[5] China is expected to increase its use of freight transportation fuels by more than 320 percent from 2008 to 2035.[6]

The surge in the movement of goods presents major challenges for efforts to avert climate destabilization and threatens widespread harm to public health from tailpipe emissions.[7] Growing volumes will also require further capital investment and increase demand for the world's limited supply of fossil fuels. Thus, costs could continue to rise.

By following the examples of leading shippers, we can create a future where freight transport remains affordable, results in less carbon pollution and minimizes the threat to public health. Shippers—companies that utilize logistics services to move products but are not primarily in the freight business—have the most to gain from an increasingly carbon- and cost-efficient freight system for three reasons:

- **Profitability:** Shippers can reap the greatest financial rewards from increasing the efficiency of their logistics operations
- **Reputation management:** Since these companies interface directly with consumers, they stand to gain the most from being viewed as good environmental stewards
- **Market leverage:** Shippers dictate business trends in the goods movement marketplace; if they demand greater efficiency and better environmental performance, carriers and other logistics service providers will respond

Creative thinking means lower costs, less pollution

Initiatives are already being implemented by leading shippers today to reduce costs and improve carbon efficiency. Our goal in sharing these case studies is to help companies everywhere benefit from these solutions pioneered by industry leaders and their transport providers.

By showcasing these stories together, we demonstrate the range of opportunities available for shippers to improve freight carbon efficiency and reduce costs. Collectively, these steps can enable shippers to pursue a bold freight strategy that will produce tangible economic and environmental results.

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First, we look at companies that have been able to shift cargo to more carbon-efficient modes of transportation. We also look at changing inventory management practices, which will enable shippers to further transition to more carbon- and cost-efficient alternatives.

Next, we highlight shippers optimizing their distribution networks to cut carbon and costs. For example, several companies have made specific changes to reduce overall miles traveled. Others have leveraged partnerships—sometimes even with direct competitors – to increase efficiencies through collaborative distribution projects.

From there, we examine companies that are rethinking the goods and packaging that make up each shipment, or changing the mix of products to optimize for space and weight in order to eliminate capacity that often goes to waste.

Finally, as nearly all goods flow through warehouses and distribution centers, we look at companies that have significantly cut energy consumption by making changes to their lighting and heating systems.

Ultimately, shippers are a critical link in determining the success of collective efforts to reduce harmful freight emissions. With the steps outlined in this report, shippers can get started on this vital opportunity today.

Modes and management: picking the right tools for the job

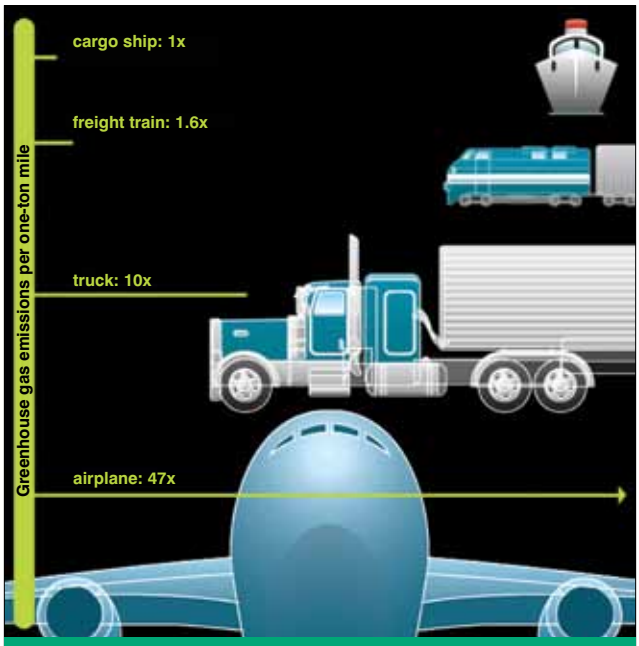
Rising fuel prices have pushed shippers to re-examine long standing practices and assumptions about transportation mode choices. The process, while difficult, has led to impressive results. Shippers are more discerning about expediting freight. They have invented solutions for more efficient modes to fit within the constraints of the "just-in-time" inventory model. Many shippers and their service providers also have adopted new inventory management models that increase flexibility. These developments are good news from a cost and carbon perspective.

For transportation mode options, air and ocean freight are the predominant choices for intercontinental transport. Freight trucks, rail and barges are the most common choices for domestic transport. Planes emit 47 times more carbon per ton mile than container ships; trucks emit six times more carbon per ton mile than trains.[8] The more carbon intensive modes typically cost more as well.

Nike led the way in differentiating cargo that needed to be expedited from cargo that could travel on the water. Prior to 2003, Nike often sent its goods via air freight from Asia, where most of its products are manufactured, to North America, where many are sold. As a result, inbound logistics—the movement of product from manufacturing facilities to distribution centers—were the second leading source of emissions, behind only manufacturing. Since 2003, Nike has taken action to reduce its inbound footprint. The company has been using air freight more sparingly and sending an increasing amount of its cargo by ocean freight.

Nike saved over $8 million in 2009 alone while also reducing its emissions per product moved by four percent with these changes.[9] On an absolute basis, it was able to limit growth in its carbon emissions from inbound logistics to 14 percent while increasing revenues by 70 percent. Encouraged by its initial success, Nike set an ambitious goal to reduce carbon emissions from inbound logistics by 30 percent from 2003 to 2020.

Computer giant **HP** also found savings in switching from air



The choice of transportation mode matters. Air freight is 47 times more carbon-intensive than ocean cargo. Trucking is more than 6 times more carbon intensive than rail.

Christine Daniloff/MIT News

Each ocean container can hold a large amount of goods – up to 70,000 T-shirts. Some of the newest cargo ships can hold up to 18,000 containers.

freight to ocean freight while still meeting time and inventory carrying cost pressures. The company changed most shipments of its Visual Collaboration studio—a TelePresence conferencing system—to ocean freight. This resulted in a savings of $7,000 and nearly 900 tons of carbon per shipment.[10]

Moving from air freight to ocean freight has even been possible in the world of high-fashion, among the most time sensitive industries on the planet. **Michael Kors**, a leading designer for high-end handbags, utilized an innovative ocean freight service through OceanGuaranteed, a joint service provided by **APL Logistics** and **Con-Way Freight**.

Ocean containers can hold a large amount of goods – up to 70,000 T-shirts[11] or 28,000 Barbie dolls.[12] Since the volume of handbags was significantly less than the size of a typical container, Michael Kors needed a service that matched loads into full containers. This "less than container load" (LCL) approach historically added transit time. Unlike a full container, which can be transported directly from the destination port to a distribution center, goods traveling via LCL traditionally need to be re-sorted upon arrival before they could be transported to their final destination via "less than truckload" (LTL) freight. Through their partnership, APL Logistics and Con-Way offered the designer a single-source option for LCL and LTL needs. The strategy helped the designer reduce the transit time by 30 percent compared to standard LCL shipments. This change also reduced carbon emissions and freight costs by $20 per bag.[13]

"The savings and sustainability benefits of inter-modal were too big to pass up. Once we had converted long-haul inbound movements, we knew we needed to try outbound moves, as well."

Tom Sangalli, Logistics and Transportation Director for The Container Store.

Intermodal transportation

Many shippers also are utilizing rail to reduce freight costs and emissions. Intermodal ground transportation—where a container is moved a long distance by rail and then delivered to its final destination by truck—allows shippers to maximize the efficiency of rail while still leveraging the flexibility of trucks. The result can be large carbon and cost savings.[14] Two of the leaders adopting intermodal are Baxter and Levi's.

Baxter, a global medical products and services company, believes intermodal transport represents a significant opportunity to cut carbon and costs. The company increased the share of U.S. shipments using intermodal transport by more than 30 percent from 2005 to 2010. By taking this action, Baxter reduced greenhouse gas (GHG) emissions by 14,000 metric tons in 2010 compared to 2005.[15]

Intermodal is a solution that is here today and has great potential for cost and carbon savings. If just 10 percent of truck shipments shifted to utilizing an intermodal strategy, one billion gallons of fuel can be saved in the United States, reducing carbon pollution by more than 13 million metric tons every year.

Levi's switched to intermodal transportation and cut carbon emissions by 60 percent in some shipping lanes. The company is currently exploring opportunities to increase intermodal transport elsewhere.[16]

Many companies have been using intermodal to deliver some of their inbound freight. **The Container Store** led the way in demonstrating that intermodal can be used for outbound transport, from distribution center to retail facility, as well.

The company had already been using intermodal freight though inbound logistics. In 2009, it partnered with **Burlington Northern Santa Fe Railway** and **J.B. Hunt Transport Services** to move inbound cargo from the west coast of the United States to Texas. A year later, the three companies decided to incorporate outbound moves.[17]

There were some initial challenges that needed to be addressed. One of the top priorities was to transport deliveries to stores within the 15-minute window required by The Container Store. To help solve this issue, J.B. Hunt gave cargo heading to the stores a priority status recognized by the drayage drivers.[18]

The endeavor was such a success that The Container Store now services nearly a third of its stores via intermodal, with stores averaging three deliveries a week. It has resulted in expected cost savings of $300,000[19] while also reducing carbon impact of transporting goods to these stores by 41 percent.[20]

"The savings and sustainability benefits of intermodal were too big to pass up," said Tom Sangalli, Logistics and Transportation Director for The Container Store. "Once we had converted long-haul inbound movements, we knew we needed to try outbound moves, as well."[21]

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Inventory management

Pressure to keep inventory levels low is one of the greatest barriers to increased utilization of more carbon-efficient modes. The cost of financing inventory is a major expense. It also requires

Intermodal ground transportation allows shippers to maximize the efficiency of rail, while still leveraging the flexibility of trucks.

resources to store and manage inventory. Inventory can quickly become obsolete because of changing consumer tastes or the introduction of a new product by a competitor.

Shippers actively work to keep inventory levels lean. For goods with a short lifecycle, such as fashion apparel and consumer electronics, many companies are unwilling to commit to the eight weeks of additional inventory that is needed to utilize ocean freight.[23]

Another challenge is that expensive or capital-intensive goods are also often expedited in efforts to minimize the amount of costly inventory that needs to be carried on the books.

Warehousing, of course, involves carbon considerations too. Holding inventory requires warehouses, which consume energy. Unsold products may be shipped back to their origin or to a third party and consume more fuel in the process. Outdated or perishable products may be simply destroyed, negating any benefit from the resources invested or the carbon emitted.

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Many companies are using new approaches to meet inventory benchmarks while still capturing the carbon and cost benefits of more efficient modes.

D.W. Morgan, a transportation and logistics provider, partnered with a client to change how a key product was transported. The client company imported a large, capital-intensive product to the United States from Asia, while also trying to minimize inventory. Using air freight to transport goods from Asia to the United States was the answer. However, this resulted in high transportation costs and emissions.

D. W. Morgan offered a solution. It would act as a value-added reseller.[24] Upon picking up product at the manufacturing facility in Asia, D.W. Morgan took title to the shipment, arranging for transportation to its U.S. facilities using ocean container shipping instead of air. The client arranged for delivery, only as needed, from D. W. Morgan's U.S. fulfillment center. By doing so, the client did not take ownership of the product until it was delivered to its door. This way it was able to keep the cost of inventory off its books, while the carbon and cost impacts of transporting goods were significantly reduced.

Another tool for inventory management is to postpone the final assembly of products until they are closer to the end consumer, as opposed to being done by the manufacturer. This practice improves efficiency by delaying the assembly of bulky products, thereby optimizing container use. Inventory levels are also reduced by enabling mass customization at the distribution center.

Kenco, a logistics service provider, serves as a useful case study. The company worked with a manufacturer in the kitchen and bath industry to develop and implement a process where semi-finished goods were kitted—customized to meet customers' requirements—at the regional distribution facility. Previously, assembly occurred at the manufacturing facility. The change allowed the manufacturer "to ship the product's components individually, maximizing trailer cube capacity, and thus saving on freight costs." In total, Kenco states its client was able to cut its inbound freight costs nearly in half.[25]

Similarly, **Bang & Olufsen**, the Danish luxury video and audio maker, follows a postponement strategy. This customized approach allows the company to "configure products to customers' specific demands for features, color and size without having to build large stocks of configurations that may not be used," thus transport less overall inventory.[26]

Optimizing the transportation network

An industry report recently found that collaborative supply chain logistics have the potential to slash costs by more than 30 percent and increase carbon efficiency by 25 percent.

Working in partnership with other companies—even competitors—to increase the efficiency of distribution systems can improve the bottom line and reduce carbon emissions. Collaboration enables greater use of assets, from trucks to warehouses, resulting in economies of scale that lower costs.[27]

Cooperating with other shippers in warehouse and distribution operations can produce significant savings. An industry report recently found that collaborative supply chain logistics have the potential to slash costs by more than 30 percent and increase carbon efficiency by 25 percent.[28]

Under a collaborative distribution arrangement, companies in the same or similar industries share warehouse and distribution assets. Because the products from the participating companies are going to the same destinations, this arrangement enables more efficient loading of trucks and more frequent deliveries. A third party logistics firm is typically involved in these arrangements and ensures security of proprietary data and fair treatment of the products for all participating companies.

Companies participating in collaborative distribution arrangements today include **Best Buy**, **Sun-Maid Growers**, **Just Born** and **The Topps Company, Inc.**[29]

In the fall of 2011, competing candy makers **Hershey's** and **Ferrero**, the maker of Tic Tac and Nutella, announced plans to collaborate on warehousing, transportation and distribution in

By coordinating with other shippers, companies sometimes can send more goods per truck trip.

North America. When announcing the collaboration, the companies highlighted the cost- and emissions-reduction benefits of the deal.[30,31]

Back-haul matching

Macy's and trucking company **Schneider National** demonstrated the value of reducing empty backhauls through Empty Miles Service, an online service provided by the Voluntary Inter-industry Commerce Solutions Association (VICS). This program helps participating companies expand their network of others wanting to identify matches for their empty backhauls.[32] In the pilot project, Macy's and Schneider found an average annual savings of $25,000 per lane and were able to reduce per-lane carbon emissions by 150 tons.[33] Given that Macy's operates over eight hundred stores[34] and likely even more lanes—a regular route on which a company moves goods—the potential savings of this program are enormous.

Direct shipment

Walmart and **Minute Maid** worked together to cut the number of trips and product miles traveled to transport Minute Maid's Simply Orange Juice to Walmart distribution centers. Previously, the product was sent from a production facility in Florida to Minute Maid warehouses in Texas, Michigan, Florida or California, then to Walmart distribution centers. The companies estimate that this change will reduce 1,500 metric tons of CO_2 emissions annually and, even more critically, add six days to the shelf life for the product.[35]

Record high oil prices and volatility over the past several years have led several companies to modify their distribution networks in order to cut fuel costs.

Co-loading freight

Dal-Tile Corporation, the largest U.S. manufacturer of ceramic tile, recently increased container utilization rates by finding freight from other companies that could be loaded atop their floor tiles. Because floor tiles are heavy, Dal-Tile previously was unable to use the full cubic space of the trailers they were shipping from Mexico to distribution centers in the U.S. Lighter freight from other companies enabled Dal-Tile and its partners to cut transportation costs up to 15 percent per load.[36]

Finding the right partner, of course, does take work. The Director of Transportation for Dal-Tile offered the following advice: Look for companies that have "similar lanes and have similar service requirements" and try to match products of similar value.

Network design

The design of a company's distribution network is influenced by many factors, including proximity to consumers, access to transportation modes, and inventory requirements. Distribution networks strive to deliver goods accurately and on time while minimizing costs. Record high oil prices and volatility over the past several years have led several companies to modify their distribution networks in order to cut fuel costs. These changes also reduce pollution and increase carbon efficiency.

Researchers at the University of Nevada, Reno modeled the optimal distribution network of a U.S.-based furniture manufacturer at different price points for diesel fuel. They found that the optimal number of facilities increased from seven to 10 when the price of diesel jumped from $2.50 to $3.50 per gallon. The change was a function of the increasing cost of long-distance transportation overtaking the cost of adding new facilities to the network.[37]

Another U.S.-based company was the focus of a separate study by David Simchi-Levi of the Massachusetts Institute of Technology (MIT).[38] Simichi-Levi found that when oil went from $75 to $200 per barrel, the optimal number of distribution centers for the company increased

from five to seven. While the distribution centers on the eastern half of the United States were largely unaffected, Simichi-Levi recommended replacing a center in Las Vegas with three separate facilities in Los Angeles, Albuquerque and Portland.

Independent Purchasing Cooperative, a purchasing cooperative for **Subway** franchises, recently modified its network. One of the company's salad packaging suppliers was moved from a facility in West Virginia to Texas—closer to the redistribution center. This move cut the supplier's annual transportation by more than one million miles, eliminated 2,000 metric tons of GHG emissions and reduced supply chain costs.[39]

Another component of a network redesign strategy is to locate manufacturing facilities closer to end customers, a practice sometimes known as near-shore manufacturing.

Alcatel-Lucent, a leader in communications technologies, established a goal to reduce its carbon footprint 50 percent by 2020. The company recognized the need to improve the carbon efficiency of its logistics operations as a key strategy to meet its carbon goal. The company decided that one way to do so was by "making products closer to customers."[40] In the past, Alcatel-Lucent's optical networking terminals destined for the North American market were manufactured in Asia. Now, these products are produced in Mexico, eliminating the need for air shipment and allowing faster order fulfillment."[41]

Getting the most out of each move

No matter what the mode of transport, companies can move goods most efficiently by maximizing the cargo capacity on each trailer, railcar or shipping container. While this simple proposition seems self-evident, competing demands of "just-in-time" inventory, smaller order sizes and rush deliveries mean it's easier said than done. More than a quarter of tractor trailers on U.S. highways are running empty.[42]

To date, Stonyfield Farm has cut costs by $7.5 million and reduced its net emissions 46 percent while still growing its business.

Stonyfield Farm undertook an extensive effort starting in 2006 to improve the environmental performance of its transportation and distribution network. To date, the company has cut costs by $7.5 million and reduced its net emissions 46 percent while still growing its business.[43] Network changes,[44] mode shifts[45] and asset utilization are all part of the comprehensive strategy.

As a first step, Stonyfield created new polices for lead times and minimum order size, and improved its ordering process to ensure its shipping containers were as full as possible.[46] It also began specifying that carriers use 53-foot trailers. The longer trailers allowed for pallets to be side loaded or "pinwheeled"—rotated 90 degrees from the standard—to create room for a minimum of 26 pallets.[47] The company also worked with its clients to redesign their pallets to lessen the need for dunnage – a form of protective packaging – to further maximize available space per trailer.

Similarly, **Kraft Foods** realized that trailer weight and space capacity were being underutilized in its Vendor Managed Inventory (VMI) system. For instance, due to the variety of products either cubing-out (reaching the trailer volume limit) or weighing-out (reaching

More than a quarter of tractor trailers on U.S. highways are running empty. Maximizing the cargo capacity is an easy way to move goods more efficiently.

Cisco Systems, which outsources most of its manufacturing and relies heavily on air freight, says it has saved more than $24 million a year from packaging improvements.

the truck weight limit) trailers, Kraft's refrigerated outbound shipments were averaging only 82 percent of the weight capacity. To address the problem, Kraft teamed up with **Transportation/ Warehouse Optimization**, a purveyor of software designed to enhance efficiency.

The AutoVLB software, also known as "Super Truck," converts demand into optimized orders to maximize truck usage without damaging products. As a result of this partnership, Kraft cut 6.2 million truck miles and reduced truckload costs by four percent.[48]

SC Johnson, a leading manufacturer of household cleaning products, launched its "Truckload Utilization Project" in 2007. The company says the project has reduced annual fuel consumption of its fleet by more than 160,000 gallons[49]—more than $500,000 at current diesel prices. This was accomplished by combining orders, reducing the use of heavier sleeper cabs and restructuring incentives for its customers.

SC Johnson also found it could improve truck utilization by combining different weights and sizes of various products. For example, the company combined its Ziploc brand products, which are light but require a significant among of truck space, with its heavier Windex glass cleaner to better utilize all the space in the trailer.

Packaging design significantly impacts container utilization rates. There are three levels of product packaging,[50] each offering opportunities to enable better container utilization:

- **Individual packaging:** Many products, such as light-bulbs, are individually packaged until consumption by the end-user
- **Group packaging:** Groups of products, such as canned goods, are also packaged for handling or in-store stocking
- **Storage and distribution packaging:** Cases of product are packaged together for storage and distribution too, such as a pallet of copy paper cases

Many factors go into product design, including optimization for transport. Take, for example, liquid laundry detergents. By removing water and creating a more concentrated product, manufacturers such as **Method**, are able to ship an equivalent amount of detergent in reduced sizes. This means more products per truck and less material for packaging.

Smart packaging methods can also result in fewer damaged products. This provides a secondary cost reduction with the lessening of damaged inventory. As damaged inventory

leads to returned products, it's important that packaging modifications consider this impact. Returns are a major logistical challenge that also has emissions implications. In 2009, $186 billion worth of merchandise was returned, accounting for eight percent of all sales.[51]

IKEA, the global home products company, implemented a broad campaign to redesign its product packaging. One early project that demonstrates the opportunity for design improvements involved the GLIMMA tealight candle, a high-volume item whose packaging contained large amounts of air and unused space.[52]

The new packaging, which required new sorting and packing machinery, increased the number of 100-pack tealights that fit in a standard European pallet by more than 40 percent. This meant fewer truck trips, which yielded carbon reductions of 21 percent.[53] The new packaging also increased efficiency by allowing for faster unpacking in stores.

Cisco Systems, which outsources most of its manufacturing and relies heavily on air freight, says it has saved more than $24 million a year from packaging improvements.[54] The company eliminated paper documentation and user guides, and placed the information on a compact disc or summary card with a link to web-based guidance. This change allowed three IP phones to fit in the same shipping space previously occupied by two phones.[55]

Cisco also identified opportunities to save materials and labor by reconfiguring product packaging for its TelePresence videoconferencing systems. With these packaging changes, nine TelePresence units now fit in each truck instead of two under the previous system. Each unit is now placed in stackable cartons, reducing the number of cartons needed per unit from 83 to nine.[56] The change has resulted in significantly lower emissions.

Minimizing transportation-related emissions is just one facet of the overall environmental impact of packaging. While transportation impact is the focus of this discussion, companies undertaking packaging changes should consider other factors too, including toxicity and use of recycled materials.[57]

Increasing energy efficiency: warehouses and distribution centers

In the journey from their point of origin to final destination, nearly all goods move through a distribution center. These vital links account for 11 percent of the carbon footprint of total goods movement.[58] Heating and lighting alone consume more than 70 percent of the energy used in warehouse operations.[59] Thus, these facilities are natural targets for efficiency gains.

Heating and lighting alone consume more than 70 percent of the energy used in warehouse operations.

Each year, dozens of companies participate in EDF Climate Corps, which places specially trained MBA and MPA students in companies, cities and universities to build the business case for energy efficiency. Several EDF Climate Corps fellows have found significant energy and cost reductions at distribution centers.

An EDF Climate Corps fellow at a leading athletic apparel company found that the biggest opportunity was a surprisingly easy fix: optimize the "sleep settings" on the conveyor motor controls. By programming the 1,200 conveyor motors to turn off in periods of inactivity, the company could avoid over 1,400 metric tons of carbon emissions a year, reduce noise levels, and cut its electricity bill by over $140,000. Best of all, outside in-house programming time, there would be no upfront cost to achieve these savings.

An EDF Climate Corps fellow that looked into a distribution center for another company suggested three lighting changes. These changes targeted the facility's parking lot, a temporary

Warehouses and Distribution Centers account for 11 percent of the carbon footprint of total global goods movement.

storage area and an annex for bulky goods. One recommendation was to switch the 400-watt metal halide lighting to more efficient fluorescent lamps. Motion sensors were suggested for the seldom-used temporal storage areas. And 250-watt high pressure sodium fixtures were replaced with 170-watt bulbs in parking lots.

US Foods also found significant savings by increasing energy efficiency in its distribution centers. As part of the Green Portfolio Program between EDF and **Kohlberg Kravis Roberts & Co.**, US Foods improved efficiency by 13 percent against a 2008 baseline. These improvements in efficiency helped US Foods to avoid approximately $9.3 million in electricity costs and approximately 73,000 metric tons of carbon emissions since 2008.[60]

US Foods also invested in cascade refrigeration systems, which use carbon dioxide as a refrigeration fluid in place of ammonia, and reduces environmental impact while increasing energy efficiency. The company also utilized high efficiency heating, ventilation and air conditioning (HVAC) systems, and replaced traditional high intensity lighting with energy efficient, and often sensor based, lighting in distribution facilities.

A warehouse owned by **Kaiser Compressors, Inc.** qualified for the EPA Energy Star labeling program as a result of several efficiency improvements. In addition to significant lighting improvements, the company improved its HVAC system. Kaiser reconfigured the control system for its HVAC systems to limit system operations on nights and weekends. The company has reduced the cooling demand from the building by installing a white Thermoplastic Olefin (TPO) roof. TPO roofs reflect sunlight as opposed to standard black roofs, which absorb heat.

Another innovation used by Kaiser to cut HVAC costs was installing an underfloor air distribution system. This system supplies warmer air than a traditional system, which reduces heating costs. It is also 30 percent more efficient than a traditional overhead variable air volume (VAV) system.[61]

Conclusions

This report shows how shippers exercise significant control over the environmental footprint of logistics operations. Their decisions on where products are made and stored, how they are designed and packaged, and how much time is allotted for transit have a tremendous impact on carbon efficiency. By leveraging the available strategies, including mode matching, container utilization, collaborative distribution, and network redesign, shippers can put us on a more sustainable path where we aren't forced trade off human health for the expeditious flow of goods. As these strategies lead to reduced costs, companies can do well by going good.

There are, of course, challenges to improve freight carbon efficiency. Orders sometimes must be rushed to facilitate promotions or changes in demand. The cost of capital and rapid rate of obsolescence prohibit some goods from using more carbon-efficient, but in some cases slower, modes of transportation. Working in collaboration requires dedicated staff and software. Companies have reasonable concerns about protecting proprietary data. Still, leaders are finding solutions to these challenges.

Given the magnitude of the changes required, the urgent need to cut fuel consumption and carbon pollution, and the complexity of the freight industry, all parties need to work together to increase efficiency and share information on sustainability advancements.

At Environmental Defense Fund, we believe these successes can be shared by all shippers and encourage companies to adopt the practices discussed in this report. We also want to hear from shippers about challenges they face in implementing these solutions. This list of actions is by no means comprehensive, and we look forward to hearing about other innovative approaches that are enabling cost and carbon reductions.

The stakes are high. The freight system is one of the world's largest sources of harmful pollution, including emissions of heat-trapping gases. To fully transform the system, other stakeholders such as carriers and governments will need to act as well. But shippers can lead the way to a more sustainable freight system and reap significant cost savings. In the process, they will make a profound and lasting difference in the effort to deliver a stable climate to our children and grandchildren.

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