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## The Missing Link in Most Supply Chains

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# Shopping for Green Alternatives

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The trend toward environmentally-friendly retail stores began with lighting, store fixtures and building materials, but today's retailers are looking toward heating, ventilation and air-conditioning (HVAC) systems to continue the green design of their operations.

The trend of green design in retail stores is no more evident than the steady climb up to 110 retail members in the U. S. Green Building Council (USGBC). This Washington, D.C.-based nonprofit organization of more than 8,500 communities from every sector of the building industry is united by the common purpose of transforming the building marketplace's sustainability initiatives. Wal-Mart, Target, Best Buy, Albertson's, L.L. Bean and Home Depot are just some of the many major retailers that are current USGBC members.

Store designers, architects and retail engineering departments at retailers such as Wal-Mart and Nike are taking the lead in focusing on green design HVAC systems. Both of these retailers are experimenting in



Store designers, architects and retail engineering departments at retailers such as Wal-Mart are taking the lead in focusing on green design HVAC systems. They are experimenting in new stores with higher efficiency mechanical systems and fabric duct air dispersion systems instead of metal duct, such as in this Wal-Mart in Aurora, Colo. | Photo: DuctSox Corp., Dubuque, Iowa.



*Nike Interior Fabric ductwork not only eliminates using metal resources, but the linear diffusers that run the entire length of the duct produce a more even airflow. This limits mechanical equipment runtime—thus saving energy and operation expenses. | Photo: DuctSox Corp., Dubuque, Iowa.*

new stores with higher efficiency mechanical systems as well as fabric duct air dispersion systems instead of metal duct.

### Wal-Mart

One example is the new Wal-Mart store in McKinney, Texas. It is substituting metal duct for lighter weight and more environmentally-friendly fabric duct manufactured by DuctSox, Dubuque, Iowa; has rooftop units by Aeon Inc., Tulsa, Okla.; and benefits from air dehumidification by Munters Corp., Selma, Texas. This esoteric combination is saving approximately 600,000 kWh of electricity per year or enough to power about 60 single-family homes for an entire year.

The fabric duct concept targets the strategy of displacement ventilation. Typical air distribution in a southern state Wal-Mart Supercenter requires approximately 450 tons of cooling. The air is distributed through conventional metal duct and register systems mounted near the ceiling. The McKinney store's present cooling load is 380 tons. Much of the 70 tons of reduced cooling tonnage is a result of displacement ventilation on the sales floor, according to Sean Timmons, P.E., principal, Timmons Design Engineers, a San Francisco-based engineering firm on the McKinney store design team. Instead of conventional metal duct and register systems located 20 to 30 feet above the sales

floor in a typical store, mounting the one linear mile of DuctSox fabric duct (only 11 feet above the floor at McKinney) cools the bottom half of the store where it's needed most. The DuctSox fabric duct has a linear array of holes that deliver supply air at a low velocity and moderate temperature of 65 to 68 degrees Fahrenheit. This eliminates hot and cold spots in the store. After gently falling to the floor and mixing with warmer air, the air slowly rises to the upper levels of the store. Ceiling-mounted return registers recycle the air back to the rooftop units where it is mixed with outdoor air and conditioned again.

While fabric duct is helping cut energy costs, there are other environmental angles such as saving natural resources. Hundreds of tons of Earth's resources in the form of metal, which would have been used in a conventional air distribution system, are saved. Additionally, energy usage and labor during construction was reduced by half because the ductwork required approximately half of the man-hours needed for metal duct installation, according to Michael Schloeman, vice president of installing contractor, CBS Mechanical Inc., Denton, Texas. The transportation cost for delivering the DuctSox to the project site is a mere fraction of the cost of shipping metal ductwork to the same site.

While the McKinney store was the springboard for increased environmental

store design, subsequent stores in Aurora, Colo., continue the chain's evolution into more efficient refrigeration, HVAC and air distribution.

Previously, fabric duct in retail stores always had the allure of aesthetics, reduced labor costs and superior air flow over metal ductwork. Today however, retail store customers are realizing the environmental value of fabric ductwork over metal and they're incorporating it into their green design strategies.

### Nike

One can also look at Nike's new Nike Factory Store at Wisconsin Dells, Wis., which is currently one of the sports apparel and equipment manufacturer/retailer's most ecologically progressive locations to date. Located in the Tanger Factory Outlet Center, the Nike Factory Store uses fabric HVAC ductwork to reduce dependence on metal resources. While many store planners are considering green design stores, Beaverton, Ore.-based Nike has been incorporating environmentally-friendly building materials such as diamond-polished concrete floor surface treatments, to eliminate chemical-based epoxy coatings and techniques—such as cutting-edge automated lighting control for several years. Fabric ductwork is a major contributor to the store's operational energy savings and

reduced upfront costs for HVAC equipment and installation costs.

Some HVAC equipment and systems can qualify a retailer for Leadership in Energy and Environmental Design (LEED®) points from the USGBC. For example, using fabric duct in a project can potentially generate one LEED® point toward the project's green building status. Certain levels of LEED® points can qualify a retail corporation for possible tax deductions. Some cities are even mandating LEED® certification levels for new buildings in their jurisdictions, according to USGBC spokesperson, Ashley Katz.

Since conventional HVAC equipment accounts for nearly 30 to 50 percent of a facility's operational cost, great strides have been

made to develop energy efficient equipment. New technologies, such as geothermal energy, have risen out of this need.

It is also very common to see variable speed compressors used in heat pumps with Energy Efficiency Ratings (EER) in the upper 20s EER. Today's vapor compression HVAC equipment has become more environmentally friendly across the field. Most ozone-harmful, chlorine-based refrigerants have been or will be phased out in favor of new blended refrigerants. In many cases the key to increased energy efficiency is using the same type of HVAC

equipment—but with new and improved technological innovations. This is where innovation, technology and creativity combine for greener buildings.

In summary, Katz adds, "Retailers are becoming increasingly interested in going green." They have much to gain from LEED® certification, including lower operating costs and increased sales numbers. The unique challenges and opportunities of implementing green building strategies into retail projects will be addressed in the LEED® for Retail rating system, currently in the pilot phase." **FMJ**



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## Greener Buildings through HVAC/R Maintenance

PAUL APPLER

Refrigerants escaping into the atmosphere from leaking, heating, ventilating, air conditioning and refrigeration (HVAC/R) equipment are major contributors to ozone depletion and today's related environmental concerns.

It's mind boggling how many pieces of HVAC/R equipment there are in commercial buildings. Most people relate to rooftop air conditioning equipment, but there could be dozens and maybe hundreds of pieces of equipment in a building ranging from walk-in coolers, refrigerators, ice makers, chillers, food service equipment, etc. Unfortunately, all of that equipment has a great potential to leak refrigerants someday.

Fixing or replacing a suddenly leaking \$30,000 rooftop HVAC/R unit on a retail store, hospital, office facility or other commercial building can shock even the most bountiful maintenance budget of a

HVAC/R sealants have only appeared on the market since around the turn-of-the-century, but they are one reason why fewer refrigerants are being accidentally released into the environment.

facility. Facility managers that know the options on failing equipment can not only save their buildings' money, but most likely save the environment of leaking refrigerants and therefore run greener facilities.

Most HVAC/R units eventually leak due to the mechanical wear of components, vibrations and various forms of corrosion. All units leak because it is impossible to manufacture a 100 percent tight system. The time for the system to completely lose its refrigerant charge can vary from one to 30 years. Then comes the decision

a facility manager must make with the service contractor—repair, component replacement or total unit replacement. On a \$30,000 rooftop unit, one may find that: 1) a repair might range from \$300 to \$1,000; 2) a component replacement such as a coil might cost \$750 to \$2,000; and 3) a total unit replacement would be \$30,000, not to mention added labor and installation costs.

There's a fourth option that might be one of the largest secrets in maintenance today—HVAC/R system sealants that stop leaks and seal future leaks for several years.

