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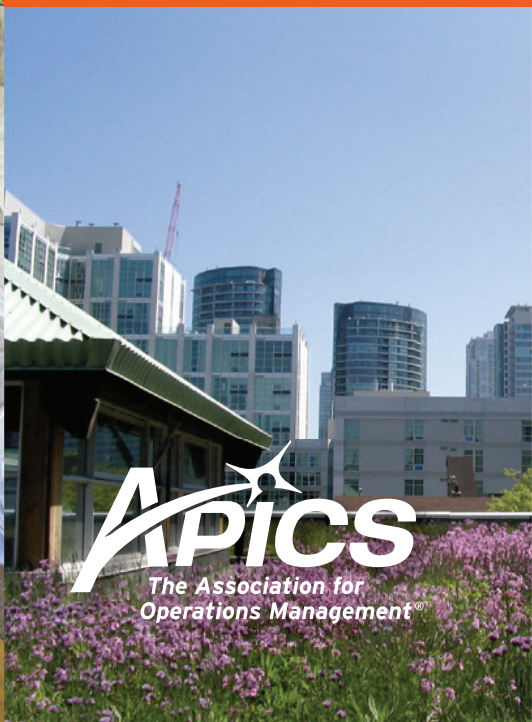
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APICS magazine (ISSN 1056-0017) is published bimonthly by APICS The Association for Operations Management, 8430 West Bryn Mawr Ave., Suite 1000, Chicago, IL 60631-3439. Phone: (773) 867-1777. Canada Post International Publications Mail (Canadian Distribution) Sales Agreement No. 571423. Periodicals postage paid at Chicago, IL, and additional mailing offices. Subscriptions: \$65 per year U.S., \$77 Canada/Mexico, \$93 elsewhere. Copyright © 2010 by APICS. All rights reserved. Printed in the United States of America. POSTMASTER: Send address changes to: APICS, 8430 West Bryn Mawr Ave., Suite 1000, Chicago, IL 60631-3439.

THE GREEN WAREHOUSE

A SIGNIFICANT STEP TOWARD SUSTAINABILITY

By Giuseppe Lovecchio, CFPIM, CSCP, CMC



Greening your supply chain not only is essential to compliance with increasingly rigorous environmental regulations, but also enables businesses to dramatically reduce or even banish waste. In the post-crisis global economy, a new mind-set is necessary in order for operations and supply chain management professionals to take advantage of these opportunities and solve environmental issues. While its role often is underestimated, the warehouse actually is the most essential factor in successful sustainability efforts.

Investing in a green warehouse can create greater profitability and heightened company reputation and image, which in turn can lead to a major increase in competitiveness. One must build and manage green warehouses according to three categories using a practical and holistic approach. These categories are

- warehouse location in a supply chain context
- warehouse design principles
- warehouse management methods and techniques.

Building design

To be globally competitive, companies are following the trend of consolidation. The idea is to place manufacturing activities and inventories in fewer strategic locations. This enables businesses to better manage risk, optimize economies of scale, reduce transportation costs, and eliminate midlevel or extra warehouses. Of course, the fewer warehouses a company has, the more it will pay for transportation.

The key is to place fewer warehouses close to intermodal infrastructures

that are built with the scope to speed up intermodal operations and reduce cost. Additionally, locating warehouses in brown fields (previously polluted areas that have been cleaned for reuse) can be an attractive approach. Instead of consuming green fields, this enables companies to make a new installation more sustainable. Table 1 shows criteria decision makers should assess when choosing a warehouse location.

Buildings account for 36 to 40 percent of a warehouse environment's total energy consumption, so they are the largest sources of emissions. Improving their energy performance clearly supports carbon footprint-reduction policy. The long-term goal is to build and manage a profitable, zero-carbon, and zero-waste warehouse by enhancing traditional warehouse operations, inbound and outbound logistics, and employee travel.

An advanced design also is an important "lean and green" warehouse prerequisite. Expert engineers and consultants can help make the most of warehouse design best practices, such as passive building methodologies, which consider orientation, materials used, available daylight, and more. Before investing in complex solutions, it can be smart to explore the principles of passive building.

A flexible layout also is essential. Changes in distribution strategies happen frequently, and it is imperative that flexible and modular warehouses have the capability to easily change their layouts. The ability to reuse a warehouse for

a different business in the coming years is very valuable. Consider expanding the building's height, reducing the number of pillars or columns, and installing inclines and ramps instead of stairways.

Insulation also should be a priority. If doors must be left open or are not hermetic, it may be better to divide the layout in areas where the temperature is homogeneous. This provides reduced energy consumption. Consider using large roof fans, which can move a big amount of air slowly, similar to a con-

PICKING AND HANDLING ACTIVITIES REPRESENT THE LARGEST ENERGY CONSUMPTION IN A WAREHOUSE AND THUS OFFER THE GREATEST OPPORTUNITY FOR GREEN ADVANCEMENT.

vection air flow. This reduces temperature gradients from floor to ceiling and thus cuts energy requirements.

Day lighting—achieved through skylight installations—is another great carbon footprint-reduction tactic and contributes to a healthier work environment. It also can be implemented very quickly. New lighting technologies offer around a 70 percent savings compared to high-pressure sodium or

mercurial vapor lighting and benefit the environment by reducing the amount of hazardous waste. Additionally, a more comfortable work environment is achieved thanks to cleaner and brighter light, without dangerous glare effects for operators. Other savings are possible with sensor and motion-control devices that regulate lighting.

The self production of energy with photovoltaic installations can be taken into account when large roofs (at least 5,000 square meters) are available after a proper feasibility analysis has been performed on orientation, latitude parameters, and the like. Similarly, wind-energy investments should be evaluated, particularly because of available tax advantages.







Finally, gray water (from the shower, bath, bathroom sink, and so on) can be used for irrigation, which reduces the use of potable water.

Warehouse management methods

Shareholders, stakeholders, managers, and operators must take into account the growing awareness of environmental issues and find innovative ways to manage their warehouses without cutting profitability. Picking and handling activities represent the largest energy consumption in a warehouse and thus offer the greatest opportunity for green advancement.

Stock location must be energy-oriented. Floating location is preferred, with the support of an effective warehouse management system, when

Table 1: Location criteria for traditional and green warehouses

TRADITIONAL	GREEN
 <p>Accessible to roads</p>	 <p>Accessible to intermodal infrastructures</p>
 <p>Proximity to market</p>	 <p>Proximity to ports, airports, and distribution parks</p>
 <p>Focus on low price</p>	 <p>Focus on balance between supply chain costs, energy, and carbon intensity</p>

THE VALUE OF YOUR INVESTMENT

Measurable environmental targets such as zero landfill waste, zero carbon emission, and minimum energy and water consumption need to be evaluated together with traditional key performance indicators. They can help determine the “greenness” of a warehouse by clearly defining metrics, best practices, and internationally recognized standards.

Energy building and warehouse certifications enable constructors and logistics company professionals to evaluate energy and waste efficiency, sustainability, the market value of warehouses, and more. Following are some examples.

LEED stands for Leadership in Energy and Environmental Design. It is a voluntary certification program developed by the U.S. Green Building Council. LEED building certification has four levels: certified, silver, gold, and platinum—which can be used in any country. Points are awarded according to the type of facility and its performance in different areas, such as sustainable site development, water efficiency, energy efficiency, innovation in design, and indoor environmental quality.

BREEAM was developed by the British Research Establishment (BRE). BREEAM stands for BRE Environmental Assessment Method, which is a five-level rating system, with five stars representing the highest level of environmental performance. The standard assesses buildings against a set criteria and provides an overall score of pass, good, very good, excellent, or outstanding.

Green star certification was developed by the GBCA (Green Building Council Australia). There are different rating tools depending on the type of facilities being assessed. GBCA awards a “green star certified” rating when minimal requirements are satisfied.

CASBEE, Comprehensive Assessment System for Building Environmental Efficiency, was developed by the Japan GreenBuild Council and Japan Sustainable Building Consortium. CASBEE assesses four fields: energy efficiency, resource efficiency, local environment, and indoor environment, with ratings including class C (poor), class B-, class B+, class A, and class S (excellent).

The European Union (EU) has defined increasingly demanding climate and energy targets that must be met by 2020. These include

- a reduction in EU greenhouse gas emissions of at least 20 percent below 1990 levels
- getting the amount of EU energy consumption derived by renewable resources to 20 percent
- a 20 percent reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.

These three points are known as the 20-20-20 targets.

appropriate. Fast-moving items should be located close to shipping areas; slow movers in the back. Heavy items should reside on low shelves and light ones on top racks.

Electric or hybrid forklifts contribute to energy savings, especially if their use is reinforced by properly organizing picking operations. The four picking methods (order, batch, zone, and wave) need to be evaluated accurately and selected for use based on their ability to minimize total duration and picking routes.

The queue time of trucks at the warehouse must be as short as possible in order to save fuel. Better planning coupled with time windows enable this savings.

Employees can save fuel in many ways, as well. The use of bicycles can be encouraged by installing dressing rooms and showers. Also consider hybrid car sharing.

Packaging is another concern. For a zero landfill-waste target to be achieved, returnable packaging is paramount. Develop a shared project with suppliers and customers where modularization and standardization will help find common solutions.

Lastly, do not underestimate the five Ss and housekeeping. One simple and effective approach is the use of micro-organisms to boost waste recycling and contribute to a more comfortable and hygienic work environment.

The right outlook

A truly green warehouse depends on proper design and construction, streamlining worker activities, the right technology, and more. But most importantly, supply chain and operations management professionals must employ the correct attitudes and behaviors in order to succeed sustainably.

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