

# Elevating Green, Lowering Costs

How efficient lift trucks help distribution centers conserve energy and foster environmental responsibility

**The Raymond Corporation**  
**Greene, N.Y.**



## Elevating Green, Lowering Costs

The rising cost of oil is the most visible driver of growing interest in energy — but by no means the only one. Business owners of all kinds are paying more attention than ever to energy management for reasons that include escalating fuel and electricity prices, sustainability initiatives, carbon footprint reduction, and branding and public image.

In the 2011 Energy Efficiency Indicator (EEI) survey from the Institute for Building Efficiency, 66 percent of commercial building executives and managers in the United States and Canada said energy management was extremely or very important to their organizations, up from 52 percent in 2010.<sup>1</sup>

Closer to the material handling world, energy efficiency is a key component of a global movement toward greening the supply chain. While much of the focus in warehousing has been on actual building systems, lift trucks use substantial energy and provide significant opportunities for savings. Warehouse owners can reduce power usage by:

- Choosing trucks designed to use the least energy per pallet load moved
- Deploying the mix of truck models with features that best fits the application
- Creating warehouse layouts that minimize travel
- Optimizing battery performance and service life

Beyond cutting electricity consumption, owners benefit by using fewer lift trucks; buying, handling and recycling fewer batteries; and saving on labor costs.

## Energy Efficiency: Fully Mainstream

The impetus for energy savings is strong domestically and globally, in the name of both savings and environmental responsibility. The 2011 EEI survey, covering nearly 4,000 building decision-makers with responsibility for facility budgets and energy efficiency programs, found that cost was the top driver of efficiency initiatives. Large majorities worldwide (81 percent) and in the United States and Canada (80 percent) expected energy prices to increase in the next year, and the average expected price increase was 11 percent.<sup>1</sup>

Meanwhile, the third-strongest driver for energy efficiency (after cost and government and utility incentives) was brand or public image. In line with that, 58 percent of respondents said their organizations had either internal or public energy-saving goals, and 56 percent had carbon reduction goals.<sup>1</sup>

Warehouse and distribution system owners share these concerns and motivations as they seek ways to conserve energy, drive down operating costs and reduce their carbon footprint. Electricity alone can be a major expense: In the freezer industry, for example, it is the second only to labor as an overhead cost.

In this light, a research survey by Aberdeen Group revealed strong interest in energy efficiency: The rising cost of energy and fuel ranked second among the top five drivers of the green supply chain, behind only the desire to be a thought leader for sustainability.



The same survey found that best-in-class companies reduced their energy costs by 6 percent, and 97 percent of those companies tracked energy usage and logistics/transportation costs.<sup>2</sup>

Because even a small percentage reduction in energy costs can mean significant dollars, owners are looking to new technologies and methods to help them conserve. Initiatives in distribution centers include installation of high-efficiency lighting fixtures and ballasts, use of occupancy sensors that turn on lights only when and where needed, heating and cooling system enhancements, and control automation to optimize fuel and power usage. In this context, it makes sense to examine lift trucks as contributors to energy savings.

### **Optimum Energy**

The most potent route to energy savings for lift trucks is a warehouse layout optimized to achieve the most efficient use of space and keep handling and travel to a minimum. The next most critical attribute is a rightsized fleet that applies the best-suited trucks to each task in the material handling process.

Fewer and more capable trucks that travel fewer miles per shift by definition minimize energy consumption. Here, a material handling expert can help an existing facility make significant inroads on better truck utilization and greater energy efficiency.

Those attributes being equal, there still are gains to be made in selecting lift trucks with the most appropriate technologies and managing them optimally. Well-reasoned choices can mean more work done in fewer hours with less energy.

### **Drivers of Truck Efficiency**

In electric trucks, the drive system, raise-lower mechanism, and other characteristics can make a substantial difference in energy efficiency between comparable units. In essence, the difference between a more efficient and less efficient truck is analogous to the difference between automobiles built today versus 10 years ago. Today's cars get greater fuel economy yet perform and handle as well or better and cost less to own. Specific attributes that enhance lift truck efficiency can include:

- > Using best-of-breed components from multiple world-class suppliers instead of designing and building most or all components in-house
- > Reducing truck weight by using a lighter suspension and mast and using strong, light composite materials where possible, as in the automotive and aircraft sectors
- > Applying variations on the principle of hybrid automobiles. Regenerative braking can extend operating hours per battery charge on counterbalanced trucks, and regenerative lowering on certain swing-reach trucks can enable up to 40 percent longer operation per charge by feeding the energy of the descending load back to the battery
- > Using one lift pump and motor instead of two, and using a small, efficient electric motor for auxiliary functions
- > Using sophisticated software and an advanced AC controller to fine-tune the drive and lift motors for maximum efficiency

## Comparisons on the Job

Differences in lift truck efficiency have been documented in independent load-handling tests comparing two different makes of four basic types of electric lift truck. Raymond conducted independent testing of its lift trucks compared with competitive models and found differences of up to 40 percent in energy consumption for an identical number of store-and-retrieve cycles completed by the same trained operators (see table). The tests were conducted by PosiCharge™, an organization specializing in electric vehicle power systems and monitored by United States Auto Club Properties Inc. (USAC Properties).<sup>3</sup>

### Energy Consumption Cost Projection Comparison

REACH TRUCKS		
	Percent energy savings	5-year Electricity Cost
Model 1	--	\$13,280
Model 2	21.3%	\$10,450
<b>5 year energy savings</b>	--	<b>\$2,830</b>
TURRET TRUCKS		
	Percent energy savings	5-year Electricity Cost
Model 1	--	\$14,415
Model 2	40.0%	\$8,650
<b>5 year energy savings</b>	--	<b>\$5,765</b>
STAND-UP COUNTERBALANCED TRUCKS		
	Percent energy savings	5-year Electricity Cost
Model 1	--	\$15,200
Model 2	17.0%	\$12,615
<b>5 year energy savings</b>	--	<b>\$2,585</b>
PALLET TRUCKS		
	Percent energy savings	5-year Electricity Cost
Model 1	--	\$4,150
Model 2	33.6%	\$2,755
<b>5 year energy savings</b>	--	<b>\$1,395</b>

Based on five years of three-shift operation with electricity cost of \$0.08 per kWh, as documented by PosiCharge/USAC Properties test (2011).

These results illustrate the impact of high-efficiency AC drive systems that enable faster speeds and longer operation per battery charge. One big-box retailer with a new distribution center found that electric lift trucks with high-efficiency drives allowed operators to move 12 percent more pallets per hour and complete 20 percent more lifts per battery charge.

### Energy-saving Innovations

More improvements in truck efficiency are in the research and development pipeline. An innovation just entering the lift truck sector is hydrogen fuel cell technology, which eliminates batteries and produces only water and heat as byproducts of combustion. Now at work mostly in pilot testing, fuel cells are an attractive technology in selected applications.



Beyond the realm of product innovation, experienced material handling professionals can offer consultation to help facilities reduce their energy usage. This can include:

- > Counsel on choosing more energy-efficient lift trucks
- > Auditing current lift truck energy usage
- > Helping to develop battery-charging schedules that reduce energy consumption

Warehouse owners also can use the power of digital information to fine-tune operations and save energy. Sophisticated fleet optimization systems automatically collect multiple truck-operation data points in real time and transform the information into graphic reports that help managers evaluate and act quickly. The data can help managers:

- > Get more production from operators and technicians
- > Rightsize the fleet without sacrificing productivity or performance
- > Benchmark performance across sites and develop best practices
- > Optimize lift truck capital and maintenance costs

The latest enhancement to this digital information is a battery asset management system that gives both lift truck operators and management personnel easy access to essential information on every battery on every truck. The system automatically monitors key battery parameters and provides data that helps users:

- > Reduce battery replacement frequency and save dollars
- > Minimize electricity consumption
- > Avoid overheating, overdischarge and other harmful conditions
- > Give operators accurate “fuel gauge” readings to help ensure timely charging
- > Collect and analyze data for record keeping and fleet management

### **A Critical Component**

Lift trucks are an essential part of the energy picture in warehousing and distribution. Highly efficient trucks deployed in an optimized fleet and in a warehouse designed for efficient handling and travel can contribute strongly to cost savings and environmentally responsible business.

## About The Raymond Corporation

The Raymond Corporation is a global provider of unmatched material handling technology, expertise and support to increase productivity and cost-efficiency. High-performance, reliable *Raymond*<sup>®</sup> lift trucks range from a full line of manual and electric pallet trucks and walkie stackers to counterbalanced trucks, *Reach-Fork*<sup>®</sup> trucks, orderpickers and *Swing-Reach*<sup>®</sup> trucks. Through its *CustomCare*<sup>™</sup> approach, Raymond and its Sales and Service Centers deliver a comprehensive package of personalized enterprise solutions — like the *iWarehouse*<sup>®</sup> fleet optimization system, in-depth industry knowledge and consulting, flexible financing, OSHA-compliant training, and industry-leading asset protection — to optimize warehouse operations.



### Footnotes:

1. 2011 Energy Efficiency Indicator survey, Institute for Building Efficiency.
2. Building a Green Supply Chain: Social Responsibility for Fun and Profit. Aberdeen Group, March 2008.
3. Comparative data compiled by PosiCharge in testing conducted (2011) and overseen and verified by United States Auto Club Properties Inc.

For additional information about The Raymond Corporation or to locate a Raymond Sales and Service Center, visit the company website at [www.raymondcorp.com](http://www.raymondcorp.com) or call 800-235-7200.

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