


# Proven Strategies

for Saving Energy and Reducing Costs  
in a Retail Environment



Make the most of your energy<sup>SM</sup>

**Schneider**  
 Electric



10% reduction  
in energy costs  
increases profit  
margins by up  
to 6%

## I. Executive Summary

According to the U.S. Environmental Protection Agency (EPA), retail companies spend nearly \$20 billion on energy each year. Those costs generally account for 25 percent to 40 percent of ongoing building expenses.<sup>1</sup> Energy costs rose 31 percent from 2003 to 2005, according to U.S. federal figures, and there is no indication that these costs will fall in the future. In fact, the U.S. Department of Energy projects a 30 percent sustained increases in the cost of electricity.<sup>2</sup>

The impact of high energy prices is felt in every corner office and boardroom. A recent Duke University study ranked high energy costs as the number one concern of executives, ahead of even healthcare costs and rising interest rates for U.S. corporations. Yet, remarkably, the same study revealed that only a minority of companies have made any attempt to improve the efficiency of their facilities.<sup>3</sup>

Better energy management can, however, carry a sizable payoff. For example, the EPA estimates that a 10 percent reduction in energy costs at an average supermarket can boost profit margins by as much as six percent.<sup>4</sup> While some may hesitate to invest in increased up-front costs, energy efficiency investments can translate into long-term savings of 10 to 30 percent.<sup>5</sup>

A 2003 report to the Sustainable Building Task Force, which studied the results of green building in California, concluded that the use of green design and building techniques added no more than two percent to project costs. According to the report, the small increase in construction costs resulted in a payback of more than 10 times the initial investment. For example, the report stated, an “initial upfront investment of up to \$100,000 to incorporate green building features into a \$5 million project would result in savings of at least \$1 million over the life of the building, assumed conservatively to be 20 years.”<sup>6</sup>

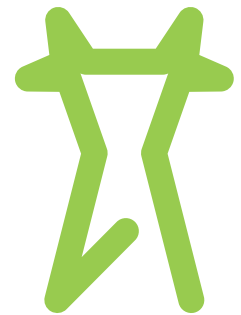
The most successful energy efficient projects are those that adopt an integrated, whole-building approach. This concept of using a combination of building technologies, including lighting, HVAC, motors and drives, controls, and automation systems, has proven to be the most effective approach to an energy upgrade. Companies that adopt an integrated approach see a cumulative effect on energy efficiency and save more in the long run compared to those that upgrade a single, isolated building technology.

According to an Energy Cost Savings Council report, “The whole-building approach may well justify — in bottom-line terms — energy-saving measures that might not otherwise win approval. With this approach, the whole can be substantially greater than the sum of its parts. That is, a whole building upgrade can deliver energy cost savings that are greater than the total gains that could be achieved by all of the components installed individually.”<sup>7</sup>

To successfully control their energy destiny, retailers must understand the vital role energy plays in their operations and include energy planning and power management in their strategic and business plans.

Many of retail's most recognized names — Wal-Mart, Walgreens, McDonald's and Lowe's among them — are embracing energy management techniques and green building practices. Integrated into new builds or existing locations, changes involve high-efficiency fluorescent fixtures, lighting controls, high-efficiency HVAC systems, and integrated power and building management systems, to name a few.

Green measures are no longer “feel good” options. Today's energy management techniques are allowing retailers to grow smarter and greener.



- 1 U.S. Environmental Protection Agency, ENERGY STAR for Retail, [www.energystar.gov/index.cfm?c=retail.bus\\_retail](http://www.energystar.gov/index.cfm?c=retail.bus_retail)
- 2 TheOpenPress.com, “Energy Survey and Waste Analysis Bring Big Savings through Energy Efficiency for Companies,” Dec. 7, 2005.
- 3 Duke University/CFO Magazine Business Outlook survey, December 2005.
- 4 U.S. EPA, ENERGY STAR for Retail, [www.energystar.gov/index.cfm?c=retail.bus\\_retail](http://www.energystar.gov/index.cfm?c=retail.bus_retail)
- 5 Schneider Electric, “Energy Management Can Fuel Long-Term Profitability,” November 2007.
- 6 “The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force,” October 2003.
- 7 Energy Cost Savings Council: [www.energystar.gov/ia/business/industry/bom.pdf](http://www.energystar.gov/ia/business/industry/bom.pdf).

# Top 10 Energy Saving Strategies

1. Understand your needs before taking action
2. Automate and centralize
3. Leverage recent advancements in lighting
4. Expand lighting controls beyond on/off capabilities
5. Increase control and efficiency through VFDs
6. Track and mitigate poor power quality
7. Monitor to set benchmarks and measure improvements
8. Adopt a holistic approach
9. Manage energy as an asset
10. Establish a clear energy policy



## II. Building Blocks for Developing a Proven Energy Optimization Strategy

Even with rising energy prices, 58 percent of U.S. facility managers say their budgets have remained constant or even decreased from year to year.<sup>8</sup> The thinking has been that as long as the heating and air conditioning operates and buildings are secure, companies prefer to spend available dollars elsewhere. Retailers are stretched to keep up with repairs and maintenance.

To create an energy optimization strategy, retailers must view energy efficiency efforts as investments, not costs. The good news is that these investments will ultimately not only increase energy efficiency, but improve the bottom line. Following are 10 proven strategies to reduce electrical consumption within a retail environment. Because the retail market is an expansive and diverse group, not all solutions will apply to every retailer. They are, however, the building blocks for developing a successful and proactive energy efficiency strategy within the retail market.

### 1. Understand your needs before taking action

For existing buildings, a companywide assessment of all energy usage is the first step toward building a well-designed and fully integrated power management system. During a comprehensive energy audit, energy experts examine usage patterns and peaks, the usage patterns and costs of similar facilities in the region, utility contracts, potential maintenance issues, equipment efficiency levels, power quality levels and more.

By monitoring and analyzing usage, companies improve internal awareness of how much and for what purposes energy is being consumed. That provides an opportunity to track needs and allocate resources in the most efficient way possible.

From a financial and procurement viewpoint, it is important to analyze price trends and market influences against actual energy usage patterns. That insight can be used to negotiate price with energy suppliers. Since unexpected price hikes will occur, businesses must understand their own risk tolerance to pursue hedging opportunities or strategies.

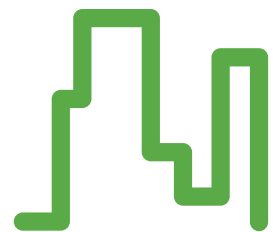
For retailers with plans for expansion, it's critical to have hard data to show whether the existing electrical infrastructure can support growth. Careful analysis of existing usage patterns can be invaluable for companies looking to better track costs and forecast how much additional power is needed to prepare for growth.

The end result of a comprehensive energy audit is a blueprint for a more efficient operation with the potential for lower consumption, better power quality and improved reliability. In most cases, suggested steps for implementation come with an expected return on investment. Potential opportunities are typically prioritized according to their cost and rate of return.

The energy audit process is an effective and structured approach to identify opportunities for savings and determine the order in which they should be undertaken.

### 2. Automate and centralize

In an ideal retail environment, all building systems are monitored and controlled through one integrated, centralized solution. Systems that support the heating, cooling, refrigeration, lighting, sump pumps, balers, fire, security and other building operations are integrated into one program.



<sup>8</sup> Survey conducted in 2004 by the International Facility Management Association, MFLink, the Association for Facilities Engineering (AFE), The Association of Higher Educational Facilities Officers (APPA), The Building Owners & Managers Association (BOMA) and *Building Operating Management* magazine.

For retail chains, centralizing building and energy management through an enterprise-wide system allows operations to be streamlined and standardized. A centralized system allows benchmarking for best practices and forecasting costs across the enterprise. The system gives chain store owners greater control over budget planning and provides the foundation for more informed decision-making. Centralized management also enables the aggregation of data and tracking of trends, promoting better operational decisions targeted at achieving the desired cost savings.

By remotely monitoring and controlling building operations from a central office, facility managers can see a simultaneous reduction in energy consumption and on-site man-hours required for facility upkeep and maintenance. The system relieves site-specific management of many non-core business functions, which leads to improved business results as more time is made available to focus on customer needs. What's more, time management efficiencies can be improved further through faster and more accurate diagnostics, less planned and unplanned maintenance, and by leveraging best practices borne out across the enterprise.

Energy management systems alert staff when problems are identified and require manual intervention. If a freezer door is left open, for example, the system will trigger an alarm to notify the appropriate contact person in the store, at the headquarters or, if necessary, at the contact person's home to rectify the problem before perishable product is lost.

Web-based building management systems give facility managers the added benefit of accessing the system from anywhere at any time. Being able to access and control the system from home in the event of a late-night alarm can be a convenient and timesaving option for retailers.

**50%**  
reduction  
in electrical  
lighting load  
possible  
with the  
installation  
of compact  
fluorescent  
lightbulb

### **3. Leverage recent advancements in energy efficient lighting**

In retail facilities lighting is nearly always the single greatest electrical expense, accounting for up to 50 percent of electricity charges — 60 percent in specialty apparel retailers. By installing high-intensity T5, T8 and compact fluorescent lamps, facilities can cut their lighting electrical loads up to 50 percent when compared with conventional HID lighting.

What's even more encouraging is retailers can take this step toward greater efficiency while improving the lighting quality with whiter and brighter illumination capabilities. High-output fluorescent lighting has lower lumen depreciation rates, better dimming options, virtually instant start-up, better color rendition and lower glare than conventional HID fixtures.<sup>9</sup>

Properly lit stores are critical to maximizing sales. Today's energy efficient lighting technology allows retailers to have superior lighting while still reducing operating costs. A popular merchandising trend is to use task-focused or track lighting to create more dramatic displays. By replacing 100-watt incandescent (halogen) lights in those displays with 39-watt Ceramic Metal Halide (CMH) lights, retailers can save energy while achieving the same output and color rendering. The lower wattage also generates less heat, which translates into HVAC savings. In addition, there are maintenance efficiencies with CMH lights since they have a 10,000 to 15,000 hour lamp life compared to halogens that average about 2,000 to 3,000 hours.

According to the Energy Cost Savings Council, energy efficient lighting generates an average project payback period of 2.2 years and a 45 percent return on investment, a better payback than other energy-saving building system technologies.

When illuminating food cases, many retailers have replaced fluorescents with LEDs, which use even less energy, have a much longer burn time and give off virtually no additional heat — reducing refrigeration costs.

<sup>9</sup> Energy Design Resources, "Design Brief – Options and Opportunities," 2001.

#### 4. Expand lighting controls beyond on/off capabilities

Today, schedule-based lighting control systems are common among most retailers. However, new advancements, such as schedule-based dimming and automated demand management programs, have introduced a new level of control and automated efficiency.

For example, for large, 24-hour retailers, there are multiple options to reduce consumption. Simple schedule-based controllers can turn off lights in unused areas of the store, such as back rooms, unused sections of the grocery store or other areas that are not used during late-night hours. Additionally, many retailers are taking steps to automatically dim their general lighting by as much as 30 percent as it gets later in the evening. By gradually reducing the light levels over a period of five to 10 minutes, the change is virtually undetectable to shoppers.

Reduced light levels also are commonly used when faced with brownout conditions by the utility. Rather than turning off or down air conditioning, which can have a dramatic impact on customer comfort, many retailers first initiate a pre-programmed option to reduce light levels. A helpful side effect of doing so is less heat is generated by the lights, which translates to less cooling needing to be done by the HVAC system.

In some cases, retailers that are working within demand management programs can have their lighting control systems communicate directly with utilities. When the utility prepares to reduce its supply, it sends an electronic signal to the retailer. Upon receiving the notification, the retailer's lighting control system automatically dims light levels down to a pre-determined level. The energy-saving process can occur without any assistance from the facility manager.

Other lighting control technologies, such as motion detectors, also can play an important role in reducing consumption in smaller areas with less traffic, such as changing rooms, restrooms and back-office work areas. Motion detectors will override a schedule-based system and only initiate lighting when customers or staff are present.

Daylighting is one option that has proven to provide extra benefits at the register. The combination of natural skylights and sensor-driven artificial lighting can increase average daily sales by 40 percent, according to a 1999 study by the Pacific Gas and Electric Company (PG & E). According to the study, shoppers reported finding the sky lit stores to be cleaner, more spacious, and more open than stores without skylights. Researchers postulated that the skylights relaxed customers, improved product visibility, made products appear more attractive and boosted employee morale. Correlated profit increases even outperformed the intended energy savings.<sup>10</sup>

Exterior lighting fixtures can include ambient light-level sensors to help initiate parking lot lights during inclement weather conditions and turn them off at sunrise, maximizing safety and energy efficiency whenever appropriate.

**40%**  
increase  
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daily sales  
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daylighting

<sup>10</sup> Heschong Mahone Group, "Skylighting and Retail Sales: An Investigation into the Relationship Between Daylighting and Human Performance," for the Pacific Gas and Electric Company, 1999.

The key to identifying the energy savings opportunity of VFDs in HVAC systems is to understand the operating cycle of the system versus the heating and cooling needs actually required.



## 5. Increase control and efficiency through VFDs

Retailers routinely struggle to balance customer comfort while reducing their heating and cooling bills. Favoring one side may result in an unpleasant experience for customers, while favoring the other will increase costs. The variable frequency drive (VFD) has become a proven tool for striking a balance between comfort and efficiency.

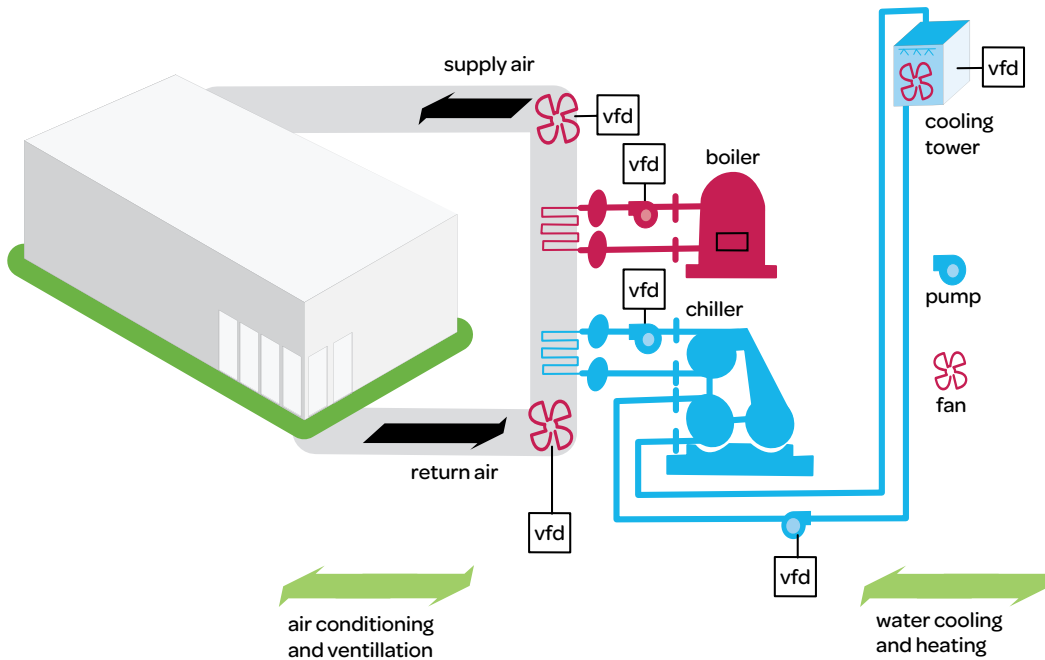
The key to identifying the energy savings opportunity of VFDs in HVAC systems is to understand the operating cycle of the system versus the heating and cooling needs actually required. Most HVAC systems are designed to keep the building cool on the hottest days and warm on the coldest days.

Therefore, the HVAC system only needs to work at full capacity on the 10 or so hottest days and the 10 or so coldest days of the year. On the other 345 days, the HVAC system typically operates at a reduced capacity. This is where a variable air volume system with VFDs can be used to automatically match air flow to actual heating and cooling demands.

VFD's reduce the motor speed when full flow is not required, thereby reducing the power required and the electrical energy used by fans and pumps. It's a general rule of thumb that a centrifugal pump or fan delivering 80 percent of its rated flow only requires 50 percent of the rated power.

If a building had a constant-volume air handling system with no variable speed drives, the system would run at full speed all the time. The boiler and chiller would continue to create hot or cold air, respectively, regardless of the amount needed. If a room didn't need hot or cold air, the air from the ductwork either would be dumped outside or in the mechanical room, effectively wasting it and the energy required to heat or cool it. Using dampers to mechanically adjust the airflow output into the appropriate rooms does not control the speed of the motor and does not save energy.

VFDs are also an ideal solution for refrigeration systems. Rather than running compressors continuously at 100 percent, VFDs can be programmed to automatically increase speed as the suction temperature increases. When the temperature is safely within a specified zone, VFDs reduce the compressor speed and dramatically reduce the energy consumed.



Example of VFD application in air handling and water systems for a retail building

## 6. Track and mitigate poor power quality

Power quality is also an important consideration for many large retail facilities. Poor power quality can be generated by multiple sources, including the electrical utility, nearby businesses or equipment within the facility. For example, drives used with HVAC or refrigeration systems commonly produce harmonics. Harmonics are reflections coming back from a drive or other on-line equipment that show upon the power line at frequencies other than 60 hertz and reduce the available energy on the power line. As a result, more current is drawn to compensate for the harmonics on the system. Harmonics damage sensitive electrical equipment on the power line and contribute to poor power factor. As a result the retailer is hit with unnecessary charges and, in some cases, costly penalties from the utility.

An effective power design includes solutions, such as 18-pulse VFDs or power factor capacitors, which will mitigate those issues.

Sudden power surges caused by lightning strikes or other anomalies on the power line can damage or temporarily shut down sensitive point-of-sale electrical equipment. Surge suppressors and uninterruptible power systems (UPSs) protect that equipment and help ensure that only clean energy reaches the electrical load. Some UPSs also filter out harmonic distortion and increase or decrease power levels when sags or swells occur on the line.



### Satisfying ASHRAE® 90.1

The 2001 edition of ASHRAE 90.1, the comprehensive energy efficiency standard for the entire building envelope and all systems, requires automatic lighting shutoff, meaning lights in building spaces must be shut off either automatically through the use of occupancy sensors or via a schedule-based control system.

Many state and local building codes are based on ASHRAE 90.1, as are many facets of the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED®) program.

For example, one of the prerequisites of the energy and atmosphere components for the LEED new construction program (LEED-NC) is meeting both the mandatory provisions and prescriptive/performance requirements of ASHRAE 90.1-2004. This standard requires lighting control for all non-residential buildings more than 5,000 square feet via time schedules or occupancy sensors.



## 7. Monitor and measure improvements

Accurate front-end energy usage data is critical to understanding where the greatest saving opportunities lie and what progress has been made since system or process changes have been implemented. To capture the energy usage data, facilities rely on power monitoring systems.

Today's electrical manufacturers offer a wide variety of option-rich and customizable power monitoring solutions. Circuit monitors measure electricity and other utilities, including gas, compressed air, water and steam. Furthermore, they can track kilowatts and kilowatt hours and report other diagnostic information, such as power factor, volts, amps and kVAR. To protect valuable equipment, they may have built-in alarm registers for events such as over/under voltage, current or phase loss. This is a valuable resource for retail chains that maintain multiple facilities in different geographical locations. Most advanced power monitoring systems compile aggregate data and make the information available over a simple Web browser, allowing for remote monitoring and control.

Once the proper power monitoring systems are in place to measure and record energy usage, it's important for retail owners and managers to analyze the data that's collected and gain a better understanding of their energy bill. Through its customizable reporting capabilities, advanced systems allow the user to drive maximum efficiencies by measuring energy usage against virtually any variable that's important to them. Retailers may track the total kilowatt hours used against outside or inside temperature, time of day, number of customers, level of sales, square footage or any other quantifiable value.

In retail settings where multiple panelboards are fed from the same transformer, it's especially important to also have the proper submetering set up to enable better energy decisions. Effectively designed submetering will allow a building's individual tenants to capture and analyze their own energy usage, and investigate new ways to reduce energy costs, improve reliability and minimize power quality issues.

While power meters on their own don't reduce electrical consumption, their payback has been well-documented. A study by the Energy Cost Savings Council revealed that meters and monitors have an average payback period of less than six months and an average return on investment of 200 percent.<sup>11</sup>

<sup>11</sup> Energy Cost Savings Council, [www.energystar.gov/ia/business/industry/bom.pdf](http://www.energystar.gov/ia/business/industry/bom.pdf).

*“In a sense, it works like compound interest. Each technology that is upgraded provides energy savings on its own. But it also provides a base on which other energy savings can grow.”<sup>12</sup>*



## 8. Adopt a holistic approach

Creating an energy efficient environment requires a holistic approach. An Energy Cost Savings Council study found that the greatest cost savings are achieved when a range of technologies and applications are used. The report states:

“In a sense, it works like compound interest. Each technology that is upgraded provides energy savings on its own. But it also provides a base on which other energy savings can grow.”<sup>12</sup>

The reverse also is true. Projects that are undertaken as one-off upgrades may look good on paper, but don’t deliver expected returns. For example, a simple retrofit of lighting can appear to save 50 kilowatts per hour on paper. In the real world, the loss of heat once provided by inefficient lighting must be made up by the heating system reducing the expected energy savings.

Connecting all building systems through one integrated application demonstrates how changes to one building system impact the others.

## 9. Manage energy as an asset

Energy “problems” offer a golden opportunity for companies willing to take the initiative. Managing facilities and energy as assets that can be invested in — with a predictable return — is the solution.

“Investments in energy efficient electrical products afford tremendous economic opportunities,” said Dr. Steven M. Bloom, principal of the financial consulting firm Capital Markets International, in an article for the Energy Cost Savings Council. Bloom writes that the Modified Internal Rate of Return (MIRR) can be as high as 29 percent — significantly higher than most other investments a company is probably making.<sup>13</sup>

According to the Energy Cost Saving Council, this opportunity is great because so many building systems are aging and out-of-date. With advances in energy efficiency over the last 10 to 20 years, there is dramatic room for savings in almost every area, “from ballasts and lamps to chillers, motors and drives.”

“When compared with other options,” Bloom concluded, “energy upgrades should be viewed by CFOs and other operational executives as investment opportunities to stand up and cheer about.”

**29%**  
Modified  
Internal Rate  
of Return  
(MIRR)

<sup>12</sup> Ibid

<sup>13</sup> Building Operating Management, “Explaining energy savings to the CFO,” February 1999.



## 10. Establish a clear energy policy

Starting with a commitment from the top, retailers need to take a proactive approach to power usage. Energy affects every area of a business, from operations to finance, so it needs to be a factor in any business or strategic plan — just as are customer service and quality control.

Identify energy leaders in all facilities. Create an energy management policy with quantifiable reduction goals. Encouraging ownership and accountability will help change behavior and drive results. Create a corporate culture that demands energy efficient thinking from everyone on the staff and rewards those who consider new solutions that promote continual improvement.

Companies that adopt a philosophy to control, manage and optimize power will turn costly expenses into a competitive advantage.

### Creating a Sustainable Mindset from the Top Down

The nation's largest retailer and second-largest energy user (behind only the federal government) provides a prime example of the importance of leading from the top and creating a corporate culture committed to conserving energy. More than two years ago, Wal-Mart CEO Lee Scott set a new standard for environmental responsibility for retailers throughout the world. The overarching goals he set were simple.

- To be supplied 100 percent by renewable energy.
- To create zero waste.
- To sell products that sustain our resources and environment.

Scott readily admitted, "These goals are both ambitious and aspirational, and I'm not sure how to achieve them...at least not yet."<sup>14</sup>

But his vision of transforming the giant retailer into one of the most environmentally-conscious companies has paved the way for multiple initiatives. Major facility improvements, experimental building designs, as well as a push to demand environmentally responsible actions from their 60,000-plus product suppliers have created a mindset to reduce energy, waste and Wal-Mart's carbon footprint.

According to the company's 2007-08 sustainability progress update, building systems have been a major focus area for working toward its energy reduction goals.

The company's environmental Web site states: "We have already tested and identified innovations that, when implement, are expected to deliver a 15 percent decrease in energy use and greenhouse gas emissions. These innovations are primarily the result of efficiency gains in improved lighting, HVAC and refrigeration units, and help move us toward our global goal of making existing stores 20 percent more efficient by 2012."<sup>15</sup>

14 Wal-Mart:  
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15 Wal-Mart:  
walmartfacts.com/  
reports/2006/  
sustainability/  
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### III. Conclusion

While there may be upfront costs, sustainable practices can deliver long-term operational savings. When building systems run as efficiently as possible, they use less energy, last longer, need fewer repairs, and ultimately, lower the lifecycle costs for equipment.

However, there are other ways retailers can benefit from more efficient energy usage. In the United States, the Energy Policy Act of 2005 provides new tax deductions and credits for energy efficient and renewable energy investments. According to an article in *Energy & Power Management*, “Pursuing energy efficiency that exceeds code increases eligibility for these tax benefits while lowering lifecycle costs.”<sup>16</sup>

There is also a growing interest in programs such as the USGBC’s LEED, which encourages environmentally responsible practices in design and energy efficient products. The green design movement has done a good job of showing return on investment. USGBC studies say that green building improvements pay for themselves within three years and can deliver up to a 30 percent increase in energy savings.<sup>17</sup>

Another benefit is employee well-being. By improving indoor air quality through cleaner and more efficient ventilation, or reducing lighting by providing more access to daylight, studies show increased employee productivity and decreased absenteeism. Those benefits can translate into improved employee retention and morale, which lead to better customer service.

The icing on the cake for energy-conscious retailers is that consumers appear to prefer to do business with companies who demonstrate a commitment to sustainability and reducing their carbon footprint. In a 2006 greening of its stores, Giant Eagle found that its LEED-certified store in Brunswick, Ohio, exceeded projections in customer satisfaction and was the highest-volume store in its division. Many other stores throughout the country are finding, as Giant Eagle did, that customers do feel that green is important.

In the end, it may come down to a one simple fact offered by the U.S. government program Energy Star: Organizations with strong energy management often outperform their competitors by as much as 10 percent.<sup>18</sup>

In today’s highly competitive retail market, it’s difficult to imagine energy optimization not being an integral component of any organization’s overarching strategic plan.

16 Energy & Power Management, “Connecting the Dots,” June 2006.

17 U.S. Green Building Council, [www.usgbc.org](http://www.usgbc.org)

18 Energy Star: [www.energystar.gov/index.cfm?c=leaders.bus\\_leaders](http://www.energystar.gov/index.cfm?c=leaders.bus_leaders).

# Energy Efficiency Solutions

The Schneider Electric team leverages the power of its companies and brands to create valuable energy efficiency solutions. From new builds to site remodels, Schneider Electric retail solutions significantly improve long-term profitability by reducing costs and increasing efficiency.

The world's leading manufacturer of electrical distribution, power and control solutions, with operations in 130 countries worldwide.

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[www.tac.com](http://www.tac.com)

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