

Energy is easy to burn and difficult to save. Here are five energy-saving ideas for material handling operations.

# 5 Ways to Save Energy Costs Today



By Tom Anandel

This article focuses on several strategies to get a handle on energy costs.

One caveat: No energy-saving strategy will be effective unless it becomes part of the company's culture. We'll shed more light on that later. First, let's look at managing lighting's cost.

### 1. Install New Light Fixtures

American Security (Fontana, Calif., [www.amsecusa.com](http://www.amsecusa.com)), manufactures steel safes, from raw sheet metal to bending, plasma cutting, welding, painting and assembly. It makes most of its parts in-house, so between making parts and making safes, material is in constant motion. As these processes change, so must the space surrounding them. To gain flexibility in the plant, the manufacturer converted its ware-

*Photovoltaic panels on the roof of Timberland's Ontario, Calif. distribution center generate 60% of the facility's power. The solar array is among the 50 largest in the world.*

**W**hether in the form of light, heat, or raw motive power, energy's invisible ubiquity makes it tough to manage. Ignore it, however, and such costs will eventually catch the attention of any company's CFO.

house from a standard open floor space with a mezzanine to one serviced by highbay racking that increased storage capacity.

American Security is just beginning to implement cellular production and other lean manufacturing processes. That's what makes production floor flexibility so important. As these processes change, so must the lighting. That can be expensive. Task lighting has to be moved every time a work cell is moved. That's why John Soler, American Security's production manager, decided to eliminate metal halide task lighting altogether.

In its place the operation relies on a constant light level throughout the plant produced by new high output, four-lamp T5 light fixtures. This lighting results in better light quality, distribution and efficiency. The new fixtures pump out more light and save energy costs to the tune of \$2,500 a month.

Lighting is a small fraction of American Security's electric bill. It consumes a lot of power thanks to 100 welders who use plasma equipment. This put the manufacturer in a position to work out a sizable rebate from the power company. American Security used this rebate as a deposit on the lighting project.

Part of the energy savings comes from the use of motion sensors wired into the ballasts of the T5 fixtures. If the sensors detect a lack of motion for an extended period, two of the four lights turn off.

"I feel strongly that lighting is important to people's attitudes and emotions," says John Soler. "Second, you can't see defects if it's too dark. We were having quality issues, especially with the paint quality of some of our high gloss paint finishes. It wasn't just the lighting in the plant but the lighting in the paint booth. Energy efficiency was the final selling point that

allowed us to make all these changes to the plant and have a positive impact on production while saving us energy. The return on investment came within 36 months."

## 2. Take Advantage of Government Incentives

The cost of lighting is driven by two things: the rate, which users cannot affect, and the wattage, which they can. According to Gloria Davis, a lighting consultant and utility specialist associated with American Lighting Supply (San Diego, [www.americanlightingsupply.com](http://www.americanlightingsupply.com)), the new fixtures that American Security installed can reduce wattage by at least half. She says that users can also cut maintenance by half because these fixtures last longer.

"With the Energy Policy Act passed in 2005, a business can write off a proj-

cient lighting.

"Even with the additional light we gave American Security's facility, they're saving approximately \$30,000 a year on their Edison Light bill," Davis adds. "The cost of the project was \$144,000, and that was for tripling his light. If this had been a one for one fixture replacement, John's payback would have been much quicker—less than a year."

## 3. Use HVAC More Efficiently

Brigade Quartermasters Ltd. ([www.actiongear.com](http://www.actiongear.com)) is a military gear and clothing catalog house based in Kennesaw, Ga. Summertime here brings 90- and 100-degree temperatures. This cataloger's 37,000 sq.-ft. warehouse went 20 years without air conditioning. It wasn't until the company decided it needed denser,

**Some facilities spend \$3 to \$4 per sq. ft. on heating and cooling. An air-moving system operates at around \$0.25 per sq. ft.**

ect like this the year it's done, rather than spreading it out over 5-7 years," she says. "That catapults the payback period. This is in addition to the rebate and in addition to the savings users see on their energy bill."

The Energy Policy Act of 2005 ([www.energy.gov/taxbreaks.htm](http://www.energy.gov/taxbreaks.htm)) offers consumers and businesses federal tax credits for purchasing fuel-efficient hybrid-electric vehicles and energy-efficient appliances and products. Most of these tax credits will remain in effect through 2007.

To qualify for this Federal tax incentive for lighting, users must install bi-level lighting, with occupancy sensors. The lighting must also be below a particular wattage per square foot and per fixture, which Davis says is easy to get to with newer more energy effi-

cient lighting that management realized a change was in the air.

"Mezzanine picking was not feasible without dealing with the environment of the building," says Geoffrey WerBell, the company's CFO. "When we started the project we had 8,000 pickable SKU sites. After re-racking we had 19,000, so we got higher efficiency out of the building. But we knew we couldn't put someone eight feet up in the air in a 130 degree temperature."

The company eventually installed an air movement system that would enable it to install only two five-ton air conditioning units assisted by eight of these air movers, strategically placed around the building.

Coenco's (Fayetteville, Ark., [www.coenco.com](http://www.coenco.com)) Positive Air System creates and maintains a uniform air tempera-

ture and low humidity. The system is designed to eliminate the pooling of tempered air at the floor and ceiling. The amount of supplemental heating and cooling needed is thereby reduced depending on the tightness of the building, geographic location, construction materials, density of materials and work activities. Supplemental heating or cooling is precisely controlled and energy use can be reduced by up to 70%.

"We put the system in a year ago October, and in the winter the warehouse became a good work environment instead of being freezing cold," WerBell says. "It stayed around 65°F, where in previous years it was in the 40s. It's a shortsleeve environment year around for the cost of two air conditioners. In the winter we used ten space heaters. We can now use two."

Frank Siccardi, the founder of Coenco, says some facilities spend \$3 to \$4 per sq. ft. on heating and air conditioning. His company's new air moving system operates at a cost of around \$0.25 per square foot, resulting in a system payback of about a year.

"We have a datalogger that takes 38 readings every

30 seconds," he explains. "It tells you how many BTUs and kilowatt-hours you used for that period. The air movers are cycling 60 seconds every ten minutes, which means 2-1/2 hours a day. It's a three-quarter horse mover, times two and a half hours which gives you an energy cost of about 10-11 cents a day at 6 cents a kilowatt-hour."

#### **4. Upgrade Conveyors**

Controlling how much energy HVAC systems consume is a part of the battle, but material handling equipment can also be made more energy efficient. Poor power factor can act as an energy drain. Inefficient use of supplied power can often be overlooked because it has few outward signs. There are no blown fuses, tripped circuit breakers, or failed electrical apparatus to alert plant personnel of a problem.

Induction loads, in particular where motors and transformers are found, along with other devices such as fluorescent lights and variable frequency drives, can use supplied power inefficiently. Take conveyors, for example.

Staco Energy Products (Dayton, Ohio, [www.stacoenergy.com](http://www.stacoenergy.com)) examined the energy use at a 165,000 sq.-ft. distribution center of a pharmaceutical manufacturer that relies on many small rated horse-power motors to power a multitude of conveyors moving product around the facility.

"We showed the company that by correcting its power factor it could save from \$900 to \$1,100 a month," says Chuck Gougler, manager of business development for

**By correcting its power factor a pharmaceutical manufacturer stood to save from \$900 to \$1,100 per month.**

Staco. "Once you determine that your utility imposes a power factor penalty, then you can sit down and rationalize what capacitors can do and figure the return on investment. Generally it's two years or less."

Many utilities offer incentives for the use of such equipment. Working with a specialist in power usage to conduct a facility walk-through and analysis may help identify other savings opportunities caused by harmonic issues, the need for surge suppressors, or poor grounding, all of

which affect power quality.

Gougler says if a company has a monthly electric bill of \$5,000 or more, savings from power factor correction can be substantial. He's working with a company in Texas where the annual power factor penalty is \$154,000 per year. Its electric bills range from \$1.7 to \$2.3 million annually.

"By spending \$10,000 for a capacitor bank versus \$60,000 for a new transformer, I can delay a huge capital equipment cost two or three years out," Gougler says. "Even if I do add that new transformer I'll still use my capacitors because I want that monthly savings."

Gregg Vandenbosch, product manager for Dematic Corp. ([www.dematic.com](http://www.dematic.com)), adds that by combining AC motors, variable frequency drives and distributed I/O, conveyor users can add to power factor improvement because: 1) PLC control logic adds a level of intelligence to energy usage by shutting conveyors down if no load is sensed; and 2) Variable frequency drives minimize the inrush of current at startup, reducing consumption by mak-

ing power demand-based;

With newer conveyor technologies that eliminate the need for compressed air, users can save up to \$600 per horsepower per year, Vandenbosch says. Eliminating a 100 hp air compressor could add up to savings of \$60,000 per year.

### 5. Consider Alternative Energy

From a material handling perspective, conveyors and sorters are the largest users of energy at Timberland's ([www.timberland.com](http://www.timberland.com)) 429,000 sq.-ft. distribution center in Ontario, Calif. But it's the source of that power that's the big story here.

The distribution center for the designer and marketer footwear, apparel and accessories, generates 60% of its electricity needs from a 400-kW solar panel system designed and installed by Northern Power (Waitsfield, Vt., [www.northernpower.com](http://www.northernpower.com)). Sharp Electronics Corp. ([www.solar.sharppusa.com](http://www.solar.sharppusa.com)) manufactured the solar panels, which resulted in an energy rebate of more than \$1.5 million thanks to California's Self-Generation Incentive Program. The setup creates a hedge against potential critical

peak pricing surcharges of as much as \$1 per kilowatt hour that may be put into effect in California in future summers.

The material handling equipment at Timberland's DC is made more efficient with the use of linear induction motors and an energy management system that shuts parts of the system down automatically when not in use. If a conveyor is required, sensors detect incoming cases and automatically start it up again.

The distribution center helps keep people efficient as well. The facility is not heated or cooled by traditional rooftop units. Rather, an air exchange system takes advantage of the cooler evenings in California to keep the building comfortable during the day. This system monitors the air temperatures. When the outside air is cooler, roof vents pull warm inside air outside while pulling in cool air through vents along the outside walls.

The DC's lighting was upgraded in 2003 to reduce overall lighting energy usage by close to 50%. Metal halide fixtures were replaced with T5 fixtures that feature "aisle lighter" shields to direct light downward. Lights in the narrow aisle reserve storage area feature occupancy sensors so they remain off until a lift truck en-

ters the aisle. Low bay lighting was also converted to fluorescent for additional energy savings.

Energy is also reduced during the day with the use of skylights. When sufficient sunlight is detected, photo sensors turn off the lights. When there's not enough illumination, the lights turn back on.

Timberland's manager of environmental stewardship, Betsy Blaisdell, says that facility managers who might want to install such energy saving technology should not assume that contractors are up to speed on such technology. Her advice is to first reduce energy usage with more efficient lighting and variable frequency drives. Second, look into renewable energy sources (such as solar). Managers interested in solar panels must first make sure the roof is structurally sound to support the equipment.

Don't forget to explore third-party financing options for new energy sources, which can deliver instant savings on utility costs, Blaisdell advises. Because there may be a waiting list, companies need to sign up early for any state-

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sponsored rebate programs for renewable energy.

This article has covered ways that light, heating, air conditioning and conveyors can be more energy efficient. But here's the rub: these are cultural changes, not just investments in new technology. Where equipment like conveyors is concerned, material handling managers

must take ownership of energy issues as well as functionality. Even maintenance has energy efficiency consequences.

"The big savings in the conveyance world is in managing wear of the roller bearings," says Rob Moyer, president, PRES Energy (Getzville, N.Y., [www.presenergy.com](http://www.presenergy.com)). "The connection isn't always made between good maintenance and energy expenditures."

That extends to lift truck fleet management, as well. Do all lift trucks go to work and return for charging at the same time? Plugging them in simultaneously can cause a peak in the energy demand and that translates into additional costs. Such factors make energy management everyone's job.