A Closer Look at Energy Efficiency in Food & Beverage
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Energy efficiency is no longer a top-of-mind consideration for many food and beverage manufacturers, as increasingly it’s a standard feature in the machines and equipment they buy.

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Sustainable manufacturing and green initiatives aside, energy efficiency is a tough sell. Plentiful oil and gas supplies coupled with moderate pricing don’t make it any easier. Nonetheless, utility companies and regulators continue to prod industrial users along the efficiency path, offering carrots to complement sticks to travel that route.

More than 350 rebate programs from utility companies, government agencies and other entities are available to U.S. manufacturers who upgrade to premium efficiency motors, ballparks John Malinowski, senior industry affairs manager at Baldor Electric Co., Fort Smith, Ark.

Rebates can shave a few months off ROI calculations, but efficiency ratings on
today’s electric motors make the difference between premium and standard motors negligible. A small uptick in motor efficiency is less meaningful than reliability and productivity gains, and those are the kinds of benefits OEMs are trumpeting, not energy efficiency.

Energy consumption barely registers as a consideration when fans are installed to improve worker comfort; after all, a ceiling fan is a poor man’s air conditioner, and it sips electricity compared to a compressor. Comfortable workers likely are more productive workers, although quantifying gains attributable to better air circulation is as difficult as calculating throughput improvements from better lighting.

Industrial fan manufacturers don’t even tout their units’ energy features. Instead, they focus on reductions in heating costs, particularly in the kind of high-ceilinged spaces common in food and beverage production and warehousing.

Food manufacturers “do a better job of insulating and sealing the cube off” than
other industries, says Ed Quinn, a vice president at Big Ass Fan (BAF) Co., Lexington, Ky. But a tight building doesn’t trump basic physics, and the thermal stratification that occurs in a high-ceilinged building means that the air at the top is quite a bit warmer than the air at the bottom. Forcing the ceiling air back to where the humans congregate can cut winter-time heating costs up to 30 percent.

“We pay a lot of money to heat the ceiling to 80°F even if it’s 60° at the ground,” says Quinn. As an example, he cites the installation of two 24-ft. diameter fans at the Beer Store, a Mississauga, Ontario, liquor distributor. The fans shaved 18°F from the top-to-bottom temperature variation at the 125,000-sq.-ft. facility, which has a 34 ft. building height. That resulted in a 19 percent reduction in natural gas consumption during Canada’s nine-month winter, saving the firm $35,000.

Adequate air circulation often is a quality issue in food production, whether it involves a cheese aging room or an ice cream freezer, and that’s reason enough to homogenize temperatures that otherwise would stratify. Energy reductions from an operations perspective are almost incidental.

Energy economics are a more overt driver in lighting projects, though better illumination also translates to more productive workers and less product waste. Last year, BAF hitched its star to the LED bandwagon, leveraging the talents of its 65 in-house engineers and a direct sales network to work directly with industrial clients.

A high-bay LED fixture was the first product, with washdown-ready units and other options following, including T5 and T8 fluorescents for the tradition-minded. “We thought we were late to the LED curve,” says Quinn, “but there are still a lot of people who want to lamp with fluorescents.”

**LIGHT UP MY LIFE**

BAF fabricates the fixtures. The LEDs are from Cree Inc., a global manufacturer that exemplifies the new wave of lighting suppliers. Legacy brands like Sylvania and Westinghouse are being passed around like wards of the state while manufacturers of televisions — the primary users of LED — invest in technical improvements. Siemens recently bailed from the lighting business and Philips is following suit. Samsung and other TV makers are replacing them as exhibitors at lighting industry trade shows.

Electronics are a big part of LED’s advantage. The electric surge and slow start-up that are destructive to fluorescents and metal halide bulbs are non-issues with LED, which are rated at 150,000 hours of service. Maintenance savings from bulb replacement alone were calculated at $129,000.
for a 400,000-sq.-ft. Walmart refrigerated distribution center built in Balzac, Alberta, in 2010.

Motor manufacturers stopped banging the energy-efficiency drum years ago, relying instead on mandated improvements to drive that benefit. The payback from premium motors is real, but the timeline is longer than most manufacturers willingly will accept.

Motor efficiency ratings ratcheted up a few percentage points to the 90-95 percent range under 2010 regulations, but the regulations exempted many categories, such as gear motors and brake motors. The exemptions gradually will disappear. Beginning in June 2016, open motors down to ½ HP will have to meet standards previously considered premium efficiency.

More significant is the shift away from product efficiency and toward system efficiency. Instead of mixing and matching pumps and motors, for example, manufacturers will need to look at the interplay of the drive and motor in the application.

“System efficiency isn’t just a nice idea, it’s going to be the law,” points out Tim Albers, director of marketing and product management at Nidec Motor Corp., St. Louis. “We’re within three years of this happening.” Fans and compressors also will be affected by rules being drafted, he adds.

System efficiency should push more manufacturers toward variable frequency drives. About one third of U.S. motors currently run with variable frequency drives (VFDs), compared to 40-45 percent in Europe, Albers estimates. Pairing a premium motor with a VFD will benefit a manufacturer with 24/7 production but probably not a firm running a single shift, five days a week, he points out.

Water-cooled reactors and other VFD components help boost performance and address negative side issues, such as electromagnetic interference. Photo: REO-USA

Repairing and rewinding older motors might make more sense for plants running 40 hours a week. On the other hand, repair is not an option in food production’s harshest environments. “On poultry lines, if a motor lasts two years, they’re ecstatic,” Albers says.

Service life is a concern in other food production environments, as well. Protecting the VFD investment is driving a growing
number of manufacturers toward water-cooled drive components.

Besides extending VFD life, water-cooled components require considerably less space than air-cooled drives. That’s a benefit when addressing undesirable side-effects of modern motor drives, such as electro-magnetic interference (EMI), according to Rick Jones, senior director of engineering at Indianapolis-based REO-USA, a maker of electronic and inductive components.

Automation is bringing more electronic devices into the production environment, increasing the magnitude of the EMI problem and the need for filters. That’s almost incidental to the impact on initial purchase cost and long-term energy savings that will result from the systems approach that is coming into play, notes Baldor’s Malinowski. Too often, a 92 percent efficient motor is paired with a 50 percent efficient pump.

An inefficient pump is a false economy; he cites the example of two dealers bidding on a pump project. One offered an inefficient pump driven by an 800 HP motor, the other a more expensive, efficient pump powered by a 600 HP motor. In that case, the second bidder got the order.

“Historically, we rewarded purchasing people on the lowest first cost, but that’s not always the right thing when you have electric costs that can swing the overall cost of ownership dramatically,” Malinowski says.

“Motors don’t jump out at you” when considering energy efficiency, he muses. They account for 65-75 percent of electric consumption in food & beverage, he estimates, but they are less visible consumers than, say, lights. Out of sight, out of mind will give way to a systems approach, though, helped along by young engineers.

VFD applications used to be rare in food production, both because of cost and unfamiliarity with the technology. “People are learning how to apply them to mitigate problems like EMI filtering,” Malinowski says. “The old-school guys have been replaced by younger guys who are not scared by electronics.”

Production managers are more concerned with today’s output requirement than tomorrow’s electric bill. Motor OEMs recognize that and pour R&D money into designing more robust machines that also meet higher energy-efficiency standards. As a result, manufacturers are able to lower energy inputs per unit of production while also keeping production lines humming, demonstrating that sometimes you can have your cake and eat it, too.
ADI Systems Can Help Food Processors:

• Comply with strict environmental regulations
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• Reuse treated wastewater
• Reduce surcharges and disposal costs
Consumers today are just as concerned with how food products are made as they are with how much they cost. It’s been proven that people are more likely to purchase products that have been produced using sustainable methods. According to a Nielsen Global Survey on Corporate Social Responsibility, 55% of global online consumers say they are willing to pay more for products and services provided by companies that are committed to positive social and environmental impact. This includes every step in the food production process—including the treatment of wastewater.

WASTEWATER DOES NOT NEED TO BE WASTED

Responsible wastewater treatment is directly tied to both economic and environmental sustainability. Food processors simply cannot afford to waste precious, limited resources such as water and power, yet in the rush to keep pace, too many food processors miss the opportunity to do more with less.

Wastewater is not wasted water destined to go down the drain, draining your pocketbook at the same time. Instead of treating wastewater as a by-product problem, smart food processors are redefining wastewater as a valuable resource in its own right.

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Solar-powered pasta dinner.

Food processors are turning to solar power to reduce peak demand charges and lower energy bills. One recent company in California made the switch to solar and reduced their annual bill by $250K.

ABOUT REC SOLAR

REC Solar is a leading commercial solar provider that works extensively with food processors. Visit RECSolar.com or call our energy analysts at 1-844-REC-SOLAR.
Sound familiar? I know we might be a little biased in saying this, but it is time to stop waiting. Solar panel prices have fallen 60% in the last 6 months. Food processors across the country are turning to solar to battle peak demand utility charges due to unavoidable spikes in operations. If you haven’t considered solar to reduce your operating costs, you are throwing money out the window. Changes in utility net metering or the available Federal ITC tax credits are never guaranteed. It is like what your grandmother always told you; “A bird in hand is better than a bird in flight”.

REC Solar has built hundreds of large-scale solar systems across the United States, many for businesses in the fresh or frozen foods industry. Here are some of the lessons we have learned and items to consider to help pinpoint whether now is the time to invest.

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Understanding the Impact of Air Technology on Energy Efficiency and Product Quality in the Beverage Industry

Contributed By ITW Paxton Products

The efficient and effective use of air during production and packaging is the secret ingredient helping successful beverage manufacturers gain an edge over the competition, in better product quality, reduced energy and production costs, and improved sustainability. Air technology has been used throughout the development and growth of the beverage industry; and now the latest evolutions in air technology offer tools which help cut production costs and give companies the edge they need to maintain and build market share.

THE EVOLUTION OF THE BEVERAGE INDUSTRY

The first beverages to be put in containers and sold were beers or ales of some sort. In fact, many historians connect the invention of beer to the first beginnings of both technology and civilization. These beverages were so highly esteemed that early pagan cultures often had gods and goddesses of brewing. The connection of brewed beverages and religion continued into the early Christian era with many monasteries earning renown for the quality of their brews. Until the dawn of the Industrial Age, however, the sale of beers, and later wines and distilled spirits as well, remained on a local scale.

In the 1800s, the soft drink industry first emerged. In a vast contrast from today when many soft drink brands have global sales and recognition, in those early days most soft drink businesses were not only local but seasonal with most plants closing down for after Labor Day.

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