Don Talend Portfolio: Energy Industries Content

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Career highlights include:

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- Wrote 100+ long-form technical sustainability articles
- Publications included Distributed Energy (later renamed to Business Energy)
- Content spurred $500,000+ in ad sales

Intelligent Energy Management Systems

Produce company, dairy producer and regional shopping mall optimize energy use according to varying business needs

Optimized Operations

Companies increase energy efficiency with intelligent energy management systems.

BY DON TALEND

Fresh produce at the grocery store is something that consumers commonly take for granted. When one thinks of the amount of energy consumption required to bring these commodities to market, transportation is the focus. What it takes to maintain an environment that ensures freshness at the point of sale probably is not the first thing that comes to mind.

The management at Mission Produce, Oxnard, CA, knows well what it takes to get produce into ready-to-eat condition for the grocery store. The global packer, importer, processor, and distributor of avocados and asparagus operates seven regional US ripening and distribution centers that allow just-in-time delivery. Using this network, Mission Produce—which also has operations in Mexico, Peru, Chile, and New Zealand—innovated the practice of supplying ripe avocados to retail, wholesale, and food service customers throughout the United States.

"It was probably seven years ago that ripening facilities started to pop up and helped increase per-capita consumption," says Jake Nixon, process improvement project manager for Mission Produce. "When the person at the store picks up a rock-hard avocado, they might put it back because it's not ready to eat that night. When stores were able to provide ready-to-eat product, the consumption went up. The business model changed slightly where, at the source, we try to maintain a really solid cold chain and keep as much shelf life as we can on that product, and then we try to ship it out to the distribution centers. They keep it in that suspended state of animation, and then, when it's ready for an order, they ripen it to order—that's how the business model changed."

These capabilities come at a cost, though. Several years ago, management became increasingly aware that energy costs were among the company's highest. To keep up with dynamic cooling requirements at its Oxnard and Uruapan, Mexico, facilities, the company incorporated a Powerit Solutions Spara energy management system (EMS). Mission Produce's experience is one example of how organizations are reducing energy consumption and improving their profitability through the use of intelligent, scalable EMS.

Nixon explains that the varying temperature of fruit that enters the Oxnard facility necessitates dynamic cooling environments in each of its 11 ripening rooms. The facility receives fruit from as far south as Temecula near San Diego, as well as from areas such as Oxnard, Ventura, and San Luis Obispo along the California coast. Nixon explains that incoming product can have widely varying temperatures, and some needs to be cooled more rapidly to sustain freshness.

"The demand changes so much; we might have hot product coming in from the field that we might need to cool it really quickly, which takes a lot of energy, but then storage might not take so much," says Nixon. "So we have to have a system that's capable of ripening and then cooling it back down so that we can store product. We had to design a system for worst-case scenarios because we can't afford to have the product to go bad, but then we don't want to use the full capability all the time." Nixon explains that the ripening rooms act like forced-air coolers that rapidly cool product, in contrast to more energy-intensive refrigerated rooms.

When the time came to act on the high energy costs, Mission Produce approached the Oxnard facility's power provider, Southern California Edison (SCE), about participating in a demand-response program. But implementation proved difficult without an EMS tying together the company's numerous disparate systems, according to Nixon. When the company was

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Uninterruptible Power Supply

Organizations deploy backup power systems to maintain mission-critical operations

Equipped for Continuity

Business owners explore a wide variety of electrical equipment options and renewable energy alternatives for their backup power operations.

BY DON TALEND

It's difficult to imagine a business to which backup power is more critical than Profitability.net, a Cincinnati, OH-based provider of private data center space, hosted applications, cloud computing capacity, and network storage. Redundant security is a major element of how the firm defines itself, both in terms of clients' data and equipment, and the power supply to the equipment. Any unauthorized personnel attempting to access an infrastructure cabinet would run into five layers of security; the cabinets themselves are electronically secure and provide 24/7 notification of unauthorized attempts at access. The company, which was founded in 2002, also uses a redundant flywheel UPS system to prevent outages from compromising data center cooling infrastructure and, thus, data security.

Aaron Larkins, Profitability.net's president and CEO, says that UPS redundancy has always been considered mandatory at the company's 23,000-square-foot facility, which can be expanded by 12,000 additional square feet. Until late 2008, two separate battery-based systems had been used as a redundant UPS for the company's single generator.

"We have public company clients, medical groups, and large manufacturing multi-site companies that rely on our data center to access their business applications," says Larkins. "So we made a decision that we would have a primary and redundant power source from the UPS forward to ensure that no matter what happens in that primary line, whether it's a fatal problem with the UPS, or the power distribution unit [PDU], or the circuit breakers that are feeding individual branch circuits, the customer has a secondary source of power."

In late 2008, the company had a CleanSource UPS from Active Power installed for the redundant system, and then added a second unit for the primary system a little less than a year later, replacing battery UPS systems that had reached the end of their service lives. Profitability.net's experience demonstrates the choices in equipment that managers at companies in a wide variety of industries have in protecting their power supply.

The CleanSource UPS uses a flywheel that normally spins at 7,700 rpm and stores kinetic energy. In event of a power outage, discharge energy from the flywheel provides about 15 seconds of "ride-through" power, typically a sufficient length of time for standby generators to kick in. According to the manufacturer, the system is 98% efficient. The flywheel is located between top and bottom mechanical bearings and the entire unit is enclosed in a cast-iron housing. Rather than turning on a vertical shaft, magnetic pulses turn the flywheel. The UPS steadies the kinetic energy produced by the flywheel to a 480-V, 60-Hertz output, and an automatic transfer switch transfers power from the flywheel to the standby system.

Each client's cabinet has a primary and redundant power source from the UPS forward. Each UPS feeds its own PDU that feeds the individual cabinets.

Link to article

Combined Heat and Power

Several facilities realize power and water heating cost efficiencies by implementing CHP

Upgrading With CHP

Recent financially beneficial applications demonstrate the potential for electricity generation and water heating and cooling.

BY DON TALEND

With significant heating and hot-water requirements, the 364-room Philadelphia Four Seasons Hotel has turned out to be a great fit for a combined heat and power (CHP) retrofit over the past two years. The hotel features three onsite restaurants, an on-premises laundry, and an indoor pool and spa. Until 2009, the hotel relied heavily upon the city's district steam utility and the local grid for hot water and electricity production, respectively. Management saw real potential for a dedicated CHP system to reduce energy costs and follow the sustainability movement.

The Philadelphia Four Seasons is one example of a suitable situation for a CHP retrofit. Though it is not a new concept, CHP makes sense when certain conditions exist, e.g., large-scale hot water demand and sufficiently high electric rates to justify a reasonable payback period on the investment.

"In my opinion, all hotels are good candidates for CHP," says Marv Dixon, the hotel's director of engineering. "It doesn't matter if it's a Four Seasons or a Holiday Inn—they all use a lot of hot water."

Dixon points out that the Four Seasons used to be sub-metered off of the adjacent One Logan Square office building's own hot-water production.

Hotel management worked with E-Finity Distributed Generation, Wayne, PA, to figure out a way to capture excess heat from its air-heating system and utilize it to produce hot water. The $1.1-million solution included installing three Capstone C65 ICHP MicroTurbines, which generate 200 kW, or 30% of the hotel's overall electricity. Additionally, the new system, completed in October 2009, supplies all of the building's day-to-day domestic hot water and satisfies 15% of its heating needs. In a CHP application, the units reportedly have energy efficiencies of greater than 80%. The low-emissions units (less than 9 ppmv NO_x at 15% O_2) were installed in a 37-square-meter space on the hotel's roof.

In the previous HVAC system, heat from a central plant and a hydronic heating riser were used to heat water, and the hotel used a secondary loop pump to circulate its water supply through pipes used for the domestic feed and hot water. In the retrofit, a new dedicated isolation heat exchanger was installed between the hydronic heating riser and the central plant, with an injection pump feeding the new microturbines. A preheat heat exchanger was also installed to preheat domestic hot water. The injection pump ensures that 30–40 gallons of water get to the microturbines every minute. The microturbines impart 1.2 million Btus every hour. The isolation heat exchanger heats the building and the preheat heat exchanger and microturbines heat the water.

By controlling heat production on its "side of the wall," the hotel has done away with sub-metering. Had the hotel maintained sub-metering, it might receive 140°F water and send back 145°F water while paying for heat used to process the water, Dixon contends. The hotel can still utilize hot water from the office building when economic conditions make sense, though. "In the middle of winter, when the office building is running at full [output], its energy is a little bit cheaper," notes Dixon. "So it's also a source of energy for domestic hot water at a cheaper rate than buying steam because I'm going to need extra heat. Whenever I'm heating the building full [output] with those microturbines, all that heat gets spread out. This is giving me options on where to buy the source of energy to heat my hot water."

Dixon recalls that installation went smoothly, with minimal interruption to hotel operations. The microturbines are located on the hotel roof, above the presidential suite, and produce virtually no noise: 65 decibels at 10 meters. "One of the things we're really proud of—and it's the result of good engineering, contractors, and planning on the hotel side—we've made some pretty radical changes to the anatomy of the mechanical systems and none of our guests knew that it happened," he says. "So we did not have any complaints. It all went very well."

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Turbine Technology Innovation

New modern units enable Boston-area electricity provider and Syracuse University to provide more reliable power

Keeping It Flexible

Advancements in turbines allow plant managers to increase output incrementally in some power configurations, for optimal power utilization.

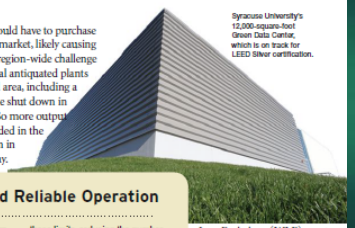
BY DON TALEND

In a Boston, MA, metropolitan area that is experiencing both considerable growth and an evolving regulatory energy environment, electric capacity will need to increase one way or another in the coming years. The Braintree Electric Light Department (BELD) is choosing to increase capacity in a forward-thinking way by taking advantage of the benefits that turbines can provide in terms of boosting grid output.

Flexibility and expandability are major potential benefits of installing turbines in power-production niches such as this. So are energy efficiency and low emissions. As utility managers try to balance an easing of the burden on regional electrical grids with finite financial resources, these prime movers are becoming a viable option in many cases.

In late 2008 the BELD installed a Rolls Royce genset consisting of two gas turbines as part of a $110 million combined cycle plant repowering project. The genset replaces a 32-year-old oil and natural gas-fueled combined-cycle gas turbine and is designed to meet the growing energy needs of the ISO-New England grid by supplying 116 MW of electrical power during peak demand. Montgomery Energy Partners LP, Houston, TX, operates the new Thomas A. Watson Generating Station in Braintree, MA, which made power commercially available starting in June 2009.

The two new Trent 60 units will provide to the ISO New England grid at times of peak demand by supplying electricity to BELD's roughly 12,500 residential and 2,500 commercial customers. ISO New England had forecast that the region will need 4,030 MW of additional capacity by 2015. Not adding output capacity would mean that BELD would have to purchase power on the open market, likely causing rates to increase. A region-wide challenge is the fact that several antiquated plants in the New England area, including a nuclear plant, will be shut down in the next few years. So more output capacity will be needed in the New England region in coming years anyway.



Syracuse University's 12,000-square-foot Green Data Center, which is on track for LEED Silver certification.

Cogeneration Institute Corp.

Inlet Cooling and Reliable Operation

Reliable operation is of concern with any equipment that is tied to mission-critical functions, such as a turbine that powers an uninterruptible power supply. The benefits of turbine inlet cooling are offered as a possibility to consider for increasing turbine reliability.

During high ambient temperature conditions, load demand may force operators to continually run the engine at its upper temperature limits, notes Dave Voeller, president of Everest Sciences Corporation, a provider of turbine generator inlet cooling solutions. Turbine inlet cooling allows the operator to back off of these limits, reducing the number of hours running at maximum temperature limits while still meeting load requirements.

Some operators experience frequent shutdowns at high ambient temperatures and high ambient loads due to the turbine exceeding its temperature limits. High costs are associated with the lost output while the engine is shut down of course. Each unplanned shutdown also results in an unnecessary restart cycle, which, over time, also increases maintenance costs. Turbine inlet cooling reduces the incidence of these events, Voeller concludes.

BELD sought a prime mover source that, more than anything else, provided flexibility in varying peak-power situations. The Trent 60 that was eventually selected generates up to 64 MW in simple cycle service at 42% efficiency while adhering to 25 ppm nitrogen oxides emission limits. It is engineered to go from a cold start to full power in less than 10 minutes and thus suit peaking and flexible power generation markets. This design allows it add power to the grid very rapidly to compensate for the fluctuations and variability of various sources of power, including renewable sources. Trent 60-powered Wet Low Emissions (WLE) generating sets run on either gas or liquid fuel and generate power outputs of up to 58 MW each. Running either separately or in tandem, the turbines can produce 25 to 115 MW—a wide output range.

BELD considered other "frame unit" turbines that were designed for combined-cycle operating mode, but the Trent 60s—which are autoderivative, i.e., designed initially for use by aircraft—provided more flexibility, says Bill Bottiggi, BELD's general manager. With frame units, "the whole envelope is more efficient than an autoderivative turbine, but also much more complex and less flexible," he says. "The key to us was flexibility. ISO New England sets the rules for how plants are reimbursed, when plants run, capacity payments versus energy payments, and they're always changing the rules, they're always tinkering. We wanted something that would still have value regardless of what decisions the ISO New England makes. We could put a combined cycle plant in and get more efficiency, but then we'd lose flexibility. ISO New England

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Lighting Energy Efficiency

Company athletic facility and hospital boost lighting quality and realize quick returns on investment

Reaching Breakeven With Little Delay

BY DON TALEND

Two case studies indicate that energy-efficient lighting upgrades can result in a rapid financial payback.

When planning a major marketing tactic, it always helps to calculate just how much the new endeavor will impact the organization's bottom line—and how quickly. Such was the case when Ampro Sports Inc., Primos, PA, recently upgraded the lighting at an athletic fieldhouse it had built in order to grow awareness of its brand and forge stronger bonds with customers. The upgrade to a new energy-efficient lighting system was expected to deliver a nearly immediate return on investment. Ampro's experience is a good example of the impact that increasing lighting efficiency can have on an organization's finances.

For 35 years, the company has provided sportswear to athletic teams as well as T-shirts and promotional items for organizations. According to Gary Huddell, the company's president, the market for team uniforms changed during the 1990s, when offshore manufacturers began to dominate the market for large-volume orders. As a result, Ampro still met demand for relatively small order volumes, but no longer fully utilized its 100,000-square-foot production facility, half of which is used for production and about one-quarter of which is devoted to a warehouse addition.

"We found that, although the warehouse had plenty of product in it, we really weren't utilizing it to the extent that we should have," says Huddell.

Back in 1996, Huddell had an idea that would both address the utilization problem and give the company a marketing boost: use some of the facility floor space for a sports facility. The idea came from one of the company's regional sales representatives, Huddell recalls.

He adds that the existing facility lent itself to an athletic field. "The way we configured the facility, it had poles, but each section was about 12,500 square feet," he says. "We knew we could open up space as a playing field."

Such a move was expected to strengthen bonds with customers and grow awareness of the Ampro brand.

"For us, it was just a natural," says Huddell. "We're actively involved with local teams, and this gives those teams the option, when it's snowing outside, to call Ampro and ask for the facility for two hours." The Philadelphia Area Disk Alliance—an organization consisting of leagues in sports such as disc golf and ultimate Frisbee—is another major user of the facility.

In sales and marketing, perception is reality. So Huddell paid particular attention to ensuring that the playing surface and lighting provided the athletic teams using the facility with a positive experience. The first order of business was settling on a quality playing surface.

"If we were going to try and build the space, obviously the space was an issue, the netting was an issue, padding was an issue, but the floor was the biggest issue," he says. "The lighting was probably secondary to the quality of the turf." A cushioned nylon monofilament fiber turf product designed for both fast play and durability, called Pure-grass, was installed on the field.

Next came a decision on lighting. The facility was equipped with what was considered state-of-the-art lighting back then: 400-W metal halide fixtures. Huddell notes

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