WHITE PAPER

CAS DATALOGGERS

Energy Efficiency For Food & Beverage Distributors

Unlocking Energy Savings for Daytona Florida Beer Distributor

Abstract

In 1873 there were approximately 4,131 beer breweries in operation in the United States, and that number declined to almost zero during the prohibition area of 1919-1933. In 1980 only 44 breweries supplied beer to all of America and that steadily grew to 5,301 breweries in 2017 according to the Brewer Association. It's estimated that the total U.S. economic impact from the beer industry is $67.8 billion. Its impact has presented the need for energy efficiency in the food and beverage industry.

This explosion of craft beer has put pressure on regional and national distributors to solve the problem of storing large volumes of craft product from national and independent breweries for their operating regions. While some beer has a shelf life of around 180 days, with the increase in popularity of craft brews such as IPA's, distributors have had to increase their refrigeration space as IPA's due to much shorter "drink by dates". To make matters worse, small amounts of craft brew cases do not make for easy storage and picking. While mainstream beer can be stored several pallets high on top of itself, reducing square footage in exchange for cubic footage storage, single pallets of craft beer typically store in their stack and utilize square footage.

With the increase in craft beer products requiring the distributors to retrofit their older buildings with more refrigerated space and requiring lower temps set by the beer producers, this results in consuming more energy every year and increasing operating expenses of storing and refrigerating this new product offering for these beer distributors.

HotWattEnergy
REDUCING WHAT MATTERS

This paper presents the findings of HotWattEnergy's energy efficiency program implemented at a beer distributor in Daytona Florida. This program has been used by hundreds of distributors nationwide with industry-leading paybacks in each case. HotWattEnergy's program takes advantage of existing refrigeration infrastructure and makes a few essential changes. The program completes the following:

1. Utilize the CAS RTR-500 Wireless Data loggers to measure and record energy usage from the refrigeration evaporators to establish a pre-installation benchmark.

2. Replace all inefficient evaporator fan motors with two speed or variable speed Electronically Commutated Direct Current motors.

3. Design and implement an engineered solution that includes multiple speed EC Motors coupled with advanced variable air volume (VaV) controllers.

4. Installation of sensing units to tell the VaV controller when the compressor duty cycle changes to increase/decrease the motor speed.

5. Utilize the CAS Wireless Dataloggers to measure and record power usage of the evaporators post installation.

6. Provide the beer distributor with payback periods of as little as 18-24 months.

The implemented solution reduced annual kWh refrigeration energy use for the beer distributor by 91.26% which will result in a total annual savings of $38,690.52 in their first year. A secondary benefit achieved that many distributors immediately noticed is the sound reduction in their workspaces by the fans running less often than the previous continuous operation.

The Purpose

This white paper demonstrates that effective control can reduce energy consumption, and that such measures can significantly reduce operating expenses and reduce the company's energy footprint. Even today, most people think only of replacing the traditional light with LED lighting or adding lighting control when reducing energy is considered. Reducing refrigeration energy usage delivers both energy reduction benefits as well as lower operating expenses for the beer industry (Brewers and Distributors).

The Problem: Increased Cooling Expenses for Craft Beer

The cost of producing a craft beer from raw ingredients, production, shipping, distribution, retailer to paying sales tax at the point of purchase is what drives up a single twelve pack of craft beer. The manufacturing process (including raw goods, production, packaging, labor, shipping, loss and brewer margin) makes up 39%, distributor margin at 21%; retailer margin makes up 31%, and taxes bring in the last 9%. As distributors implement high energy consuming refrigeration in their facilities to handle the craft beer explosion, the result is the cost that eats into that 21% margins.

For this Daytona Florida distributor, the cost per year to run their refrigeration evaporators cost the company $30,883.55. These high operating cost, eat into the company's profit and forces the distributor to find ways to cover that cost. They could increase prices to their retailers, cut other operating expenses such as jobs, or they have to sell more to make up the differences in distributor margin. Decreasing operating expenses by just a few percent effectively increases profitability exponentially.

The SMART CEW Energy Program by HotWattEnergy

HotWattEnergy is constantly looking for ways to help beer, produce, meat, fish, dairy and flower suppliers and distributors find ways to SAVE energy. The first step in the SMART CEW program is to MEASURE the facilities energy savings potential, which starts by understanding what types of refrigeration equipment is currently installed (essentially an inventory).

Collection and Analysis: Phase One

The first step in the SMART CEW energy efficiency program is to gather the relevant information from the evaporator fans required to provide an estimate energy consumption and savings analysis. Once the information is collected and analyzed, a proposal is developed and presented to the client with the estimated energy and cost reductions provided by the program and any utility incentives or financing programs available in the client's region. Once the client decides to move forward, the next step is to conduct the pre-installation data logging.

In the Distributor's case in Daytona Florida, which is not uncommon from the hundreds of other facilities across the country, the savings potential was extreme. Some refrigeration equipment replacement programs have 10-15% energy savings with return-on-investments exceeding five to ten years. The analysis for this project showed a 80-90% savings on the evaporator system, a decrease in energy cost that would pay for the project in under 2 years; resulting in more than $25K plus annual utility bill savings.

Utility Incentive Matching: Phase Two

Utility energy efficiency programs have expanded fairly steadily over the years, despite a temporary period of decline during the utility deregulation in the 1990s. HotWattEnergy's energy consultants work closely with the utility providers and regulators to assess the utility incentives and determine whether those programs are available for the customer. In pursuit of higher savings goals, electricity and natural gas programs have been expanded to help businesses make investments in energy efficiency technology. The incentive matching helps distributors offset the cost of investing in the SMART CEW program, however, in many cases, the return-on-invest is high even without the incentive programs availability.

The Pre-Installation Benchmark: Phase Three

The HotWattEnergy consultants will either install or educate the customer how to install the CAS Wireless RTR-500 Energy Datalogger into their evaporator's. The data collection period for the CAS Wireless Datalogger is a total of seven days. During this time, amperage collected for all of the evaporator motors. Once the data is collected, the results are plugged into HotWattEnergy's SMART CEW calculation algorithm to assess the potential cost savings for the clients specific CEW/Refrigerated space.

In addition to the datalogging of the evaporators within the mid-temp and low-temp Controlled Environment Warehouse spaces, HotWattEnergy works with the customer to gather their utility bills over the last twelve months so that a benchmark set for the pre-installation energy consumption of the evaporators within the refrigeration space.

For this type of refrigerated environment, HotWattEnergy utilizes the CAS Wireless Energy Data Logger and collected the following data:

Illustration 1.01: Pre-Installation Benchmarks

Cooler/Motor Names	Old CEW	New CEW	Old Keg Cooler	New Keg Cooler
Amps Per 3 Motor Evaporator	3.045836655	3.123283094	2.040995637	2.091526731
kWh per year for one-two motor evaporator	18389.76366	18857.35988	12322.86286	7827.061921
kWh per year for ten two motor evaporators	183897.6366	226288.3186	49291.45145	15654.12384
Cost per year for ten 2 motor evaps.	$11,953.35	$14,708.74	$3,203.94	$1,017.52

The Replacement: Phase Four

The fourth phase of the SMART CEW program is to replace the inefficient system with cutting-edge technology. The team at HotWattEnergy designed and implemented a state-of-the-art solution that includes an advanced variable air volume (VaV) controller, replacing inefficient single speed evaporator fans with two speed or variable speed evaporator motors. This installation takes just a matter of days and is part of in the overall project investment. Additionally, HotWattEnergy installs temperature sensors so that the VaV controller will lower the speed of the evaporator fans when optimal temperatures are hit.

The Post-Installation Analysis: Phase Five

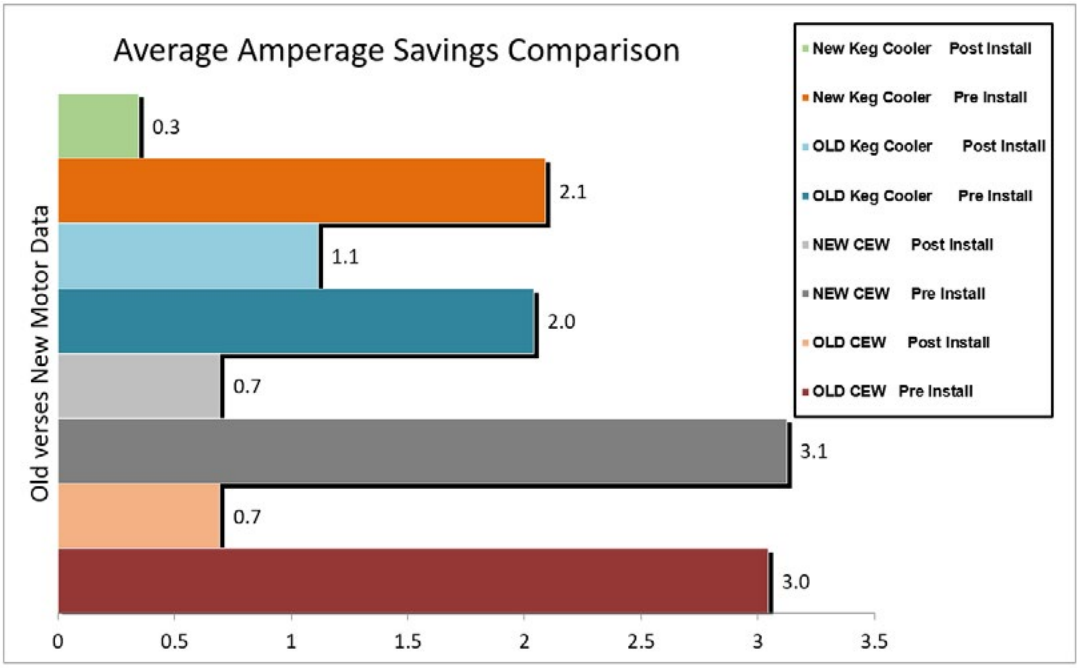
Once the installation is complete, HotWattEnergy will install the CAS RTR-500 Wireless Data loggers for another seven days to calculate the energy usage post installation. Installing the data logger allows the team to see the difference in the energy utilization over a week-long period to validate the original estimated savings calculations. Illustration 1.02 provides the post-installation data logging readings & cost savings calculated from the pre-installation data logging readings against the post-installation readings.

Illustration 1.02: Post-Installation Data Logging Readings & Cost Savings

Cooler/Motor Names	Old CEW	New CEW	Old Keg Cooler	New Keg Cooler
Amps Per 3 Motor Evaporator	0.695009494	0.695009494	1.14433855	0.347881587
kWh per year for one-two motor evaporator	1607.306756	1607.306756	2577.28431	804.5248737
kWh per year for ten two motor evaporators	16073.06756	19287.68107	10309.13724	1609.049747
Cost per year for ten 2 motor evaps.	$1,044.75	$1,253.70	$670.09	$104.59
Cost Reduction % of Change	-91.3%	-92.5%	-79.2%	-89.7%

The post-installation cost reduction for the evaporator fan motors is $27,810 and the estimated compressor, and condensing the fan motor cost reduction savings is $10,880.10, resulting in an estimated total annual savings of $38,690.52. Illustration 1.0.3 presents the side-by-side pre-installation vs. post-installation energy savings and cost savings for the Daytona, Florida project.

Illustration 1.03: Average Amperage Savings Comparison



SUMMARY

There is not a food and beverage supplier or distributor that can afford to ignore the potential for cost and energy savings – particularly for their refrigerated space energy usage. Few people fully appreciate how much energy is being blown out of the refrigerated warehouse and cooler doors every year. The HotWattEnergy SMART CEW program partnered with CAS for the data logger modules can have a truly transformational impact on gross profit margin by drastically reducing energy consumption, resulting in reducing operational expenses not just in the first year, but for the foreseeable future. An average sized beer distributor may return around $500,000 in accumulated savings over a twenty-year period by installing HotWattEnergy's solution.

For further information on the T&D RTR-500 series, or to find the ideal solution for your application-specific needs, contact a CAS Data Logger Application Specialist at **(800) 956-4437** or www.DataLoggerInc.com.