

ENERGY SAVINGS REPORT RESTAURANT/BAR SOUTHERN CALIFORNIA

[July, 2016]

ABSTRACT

Retrofit applications installed onto powered operating systems for a Restaurant/Bar include specific the areas of Lighting, Refrigeration and Air Conditioning. These changes have resulted in energy cost savings greater than 30% across the board. Specific results and recommendations are shown.

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Energy Efficiency Improvements

1. BRIEFING

In March, 2016, Energy Experts International (EEI) installed an Energy Management Monitoring System (EMS) to track energy use on selected circuits at a local Restaurant/Bar in the Southern California area. Four (4) operating systems were targeted to assess energy consumption (kWh) and power demand (kW) before any retrofits were installed and subsequently after implementation. This process was followed to assess associated energy costs per system based upon each particular installed retrofit application.

Shown in this report are screenshots from ***Analytics***, the EMS feature which reveals the energy consumption, power demand and other unique variables applicable to those circuits selected for monitoring.

Assumptions/Monthly Costs:

- Restaurant Blended energy price based on electricity bills: \$0.15 / kWh
- Power demand charge: \$13.20/ kW
- Average electric bill: \$4,000/month
- Energy savers were installed on different days during the month of May, 2016:
 - One of the Roof Top A/C Units (RTU #2) was retrofitted with an Air Conditioning Energy Saver. This installation took place on May 16, 2016.
 - Chilled Unit Energy Savers were fitted on the temperature probes inside the Beer Cooler and the Kitchen Walk-in Cooler on May 16, 2016.
 - Kitchen Fluorescent Light bulbs were replaced between May 12th to May 14th, 2016
- ***For the Roof Top Unit (RTU):*** To validate results, we compared operating performance over 6 days before and then after the changes were made. For simplicity purposes and to ensure that comparable values of outside temperature in Mission Viejo were evaluated, we compared two weeks: May 10th – May 15th vs. May 24th – May 29nd.
- ***For the Keg Cooler:*** To validate results, we selected a period of time with similar interior staff activity and temperature days in the local restaurant vicinity. The period of time selected was April 10th – 19th vs. May 16th – 28th.
- ***For the Fresh Food Walk-in Cooler:*** It should be noted that the age and condition of this condenser prevented any kind of accurate retrofit application adjustment.
 - We were successful, via the ***EMS*** monitoring controls, in alerting restaurant management of a condenser failure on two (2) separate days: May 3rd – 4th and on May 5th – 6th (see attached graphs in Section 3). These actions prevented the loss of thousands of dollars of food. Also, the current power cycling for this condenser, as of the date of this report, appears to be operating more efficiently. Further observation and testing would be necessary.



2. ROOF TOP UNIT (RTU)



- Retrofitting the RTU with the **Air Conditioning Energy Saver** controller delivered an astonishing reduction of 37% in energy consumption, or a difference over six (6) days of 177.71 kWh (see table above).
- This is equivalent to 29.62 kWh per day in reduced Energy usage or extrapolated, 10,811 kWh in Energy savings per year!
- The blended energy rate paid by the restaurant to the local Utility is \$ 0.15/kWh. This translates into expected electric bill annual savings of \$1,621.
- Given that the wholesale cost for each Air Conditioning Energy Saving controller is about \$300 per unit, a simple payback of just over 2 months is calculated.
- The restaurant has another Air Conditioner RTU which can easily be retrofitted with the same kind of unit. Additionally, the two Heat Pumps found on the roof can also be easily retrofitted with equipment which we conservatively expect will provide energy savings in the 30%+ range.
- It should be understood, that Air Conditioning power usage accounts for the largest part (anywhere from 43% – 48%) of the restaurants monthly electric bill.
- Should management complete just the available energy retrofits on all A/C and Heat Pump units, it is estimated that at least \$7,200 could be created in annual energy savings – or a hardware ROI of < 9 months.



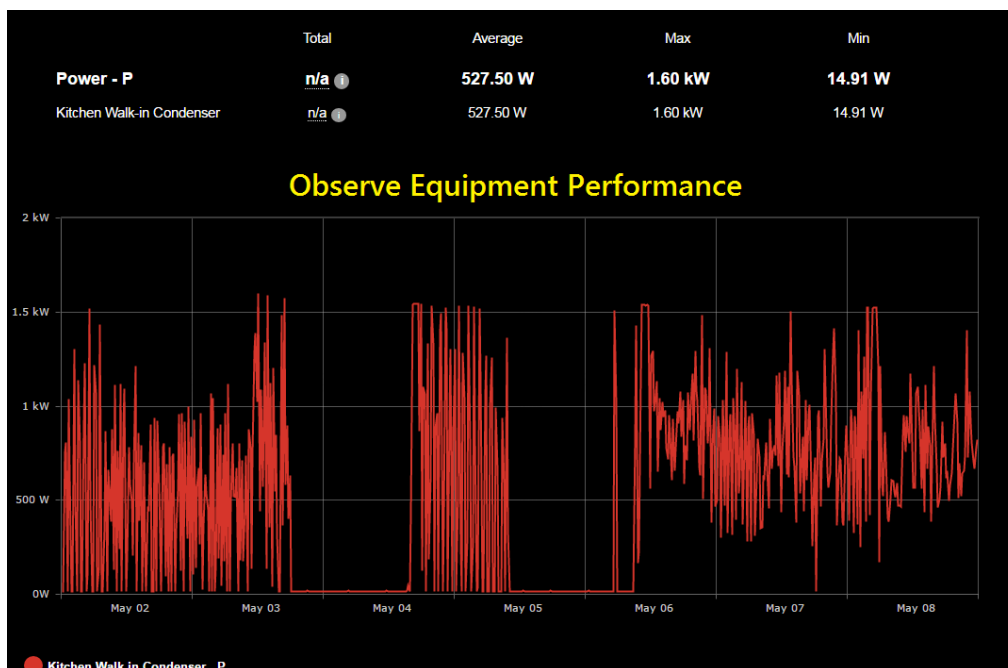
3. WALK-IN FRESH FOOD & KEG COOLERS

On May 16th we installed the **Chilled Unit Energy Saver** into the Keg Cooler of the restaurant. The key feature of this unit is that it provides a temperature reading that is closer to the actual temperature of the products inside the cooler, as opposed to reading air temperature - which can and does vary every time the cooler door opens and closes.

Energy and Power cost Savings resulting from the installation of the Chilled Unit Energy Saver is manifested in three ways:

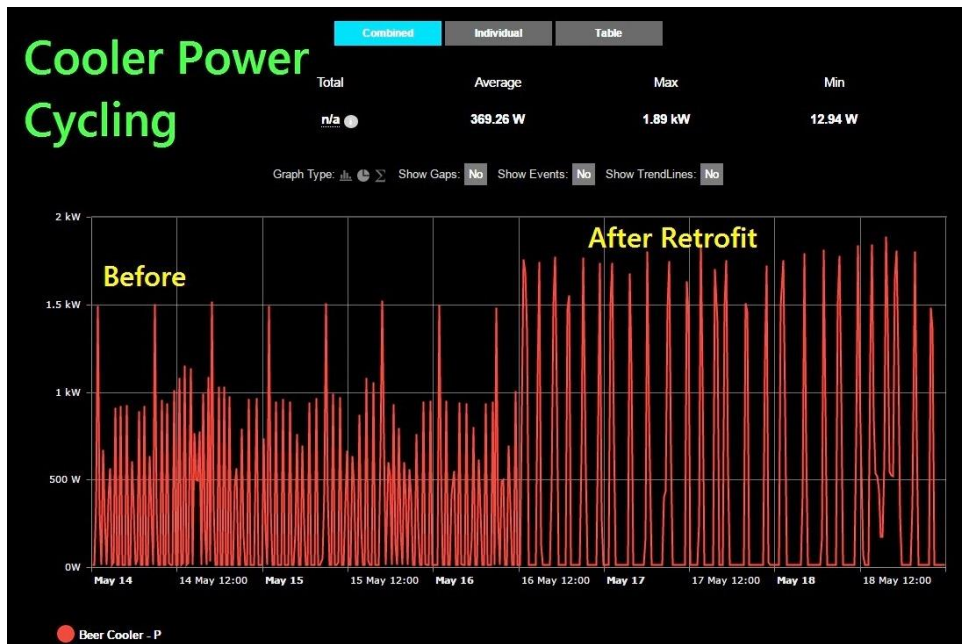
- 1) Reduced compressor run time, which accounts for approx. 80% of the refrigeration system consumption;
- 2) Internal digital temperature control can be adjusted slightly higher, saving power, because a better, more even temperature is achieved with the unit throughout the cooler box and therefore, the products inside the cooler; and
- 3) Reduced maintenance costs to the condenser itself. Something obvious although difficult to quantify, is the compressor cycling which has been reduced by one third, as seen on the power graph found on Page 5.

As discussed previously, in early May, 2016, a series of power failures occurred to the condenser for the Kitchen Walk-in cooler, all as detected by the Eniscope. Management was able to react to the condenser failure in a timely fashion and save thousands of dollars in potential lost food costs.

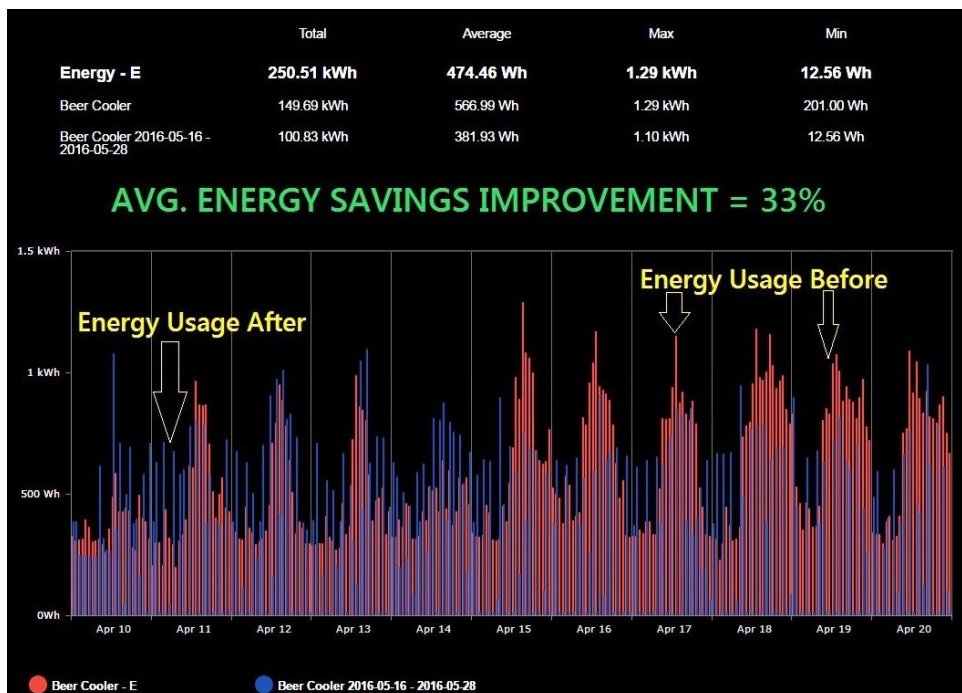




As you can see from the graph above, the power cycling of the equipment came to an abrupt halt in the late evening of May 3rd and once the apparent problem had been fixed on May 4th, a condenser hardware problem occurred again the following day. In both cases, staff from EEL monitoring the EMS alerted restaurant management. Obviously, a major benefit for restaurant management is having an EMS installed and monitoring its key powered operating systems. The issues with this particular piece of equipment were noted and due to its condition and age, a condenser replacement was recommended.

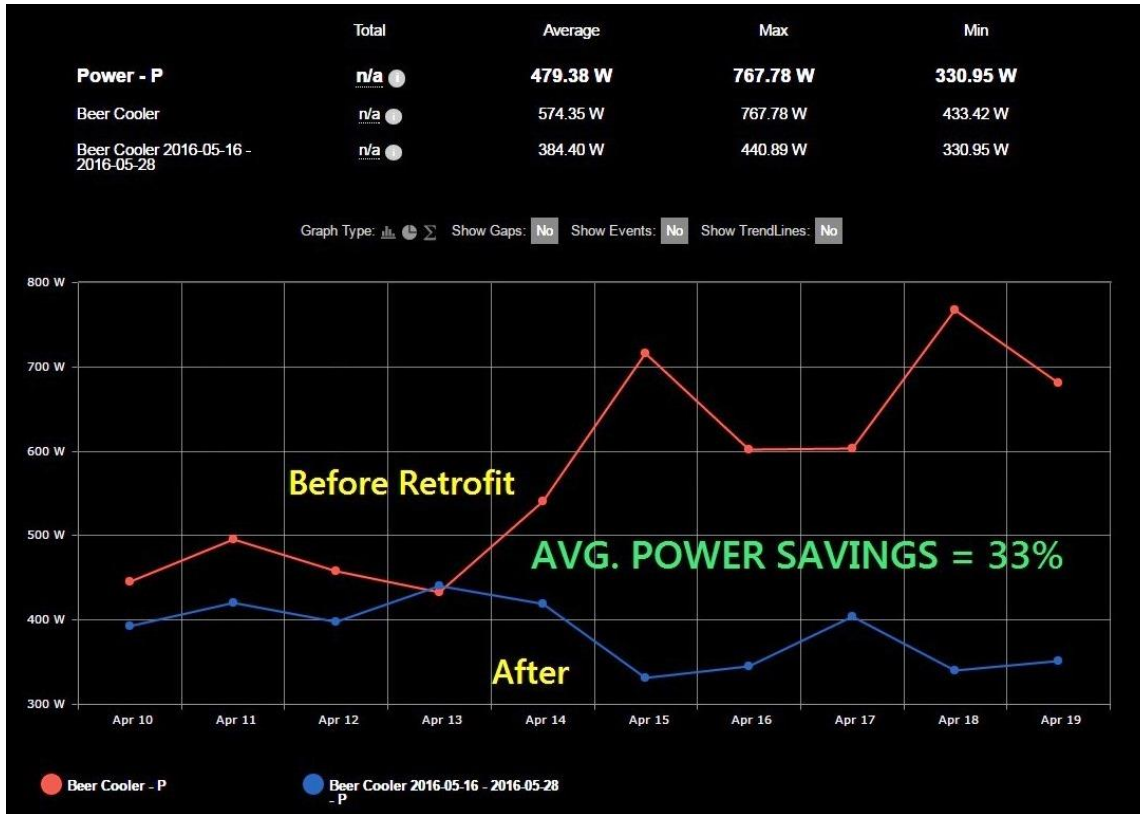


Presented above, is a graphic representation of performance for the Keg Cooler's condenser, before and after the chilled unit energy saver retrofit. The constant cycling shown from May 14th-16th dramatically changes going forward from May 16th.



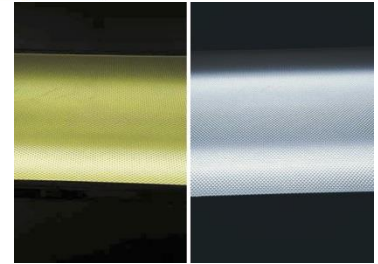


Retrofitting the Keg Walk-In Cooler with the energy saver delivered a reduction of 33% in power and energy consumption (as seen above and on the next page). This is equivalent to 4.44 KWh per day or 1,620 KWh per year. At the blended energy rate of \$0.15/kWh, this translates into annual savings of \$243 per year per unit.



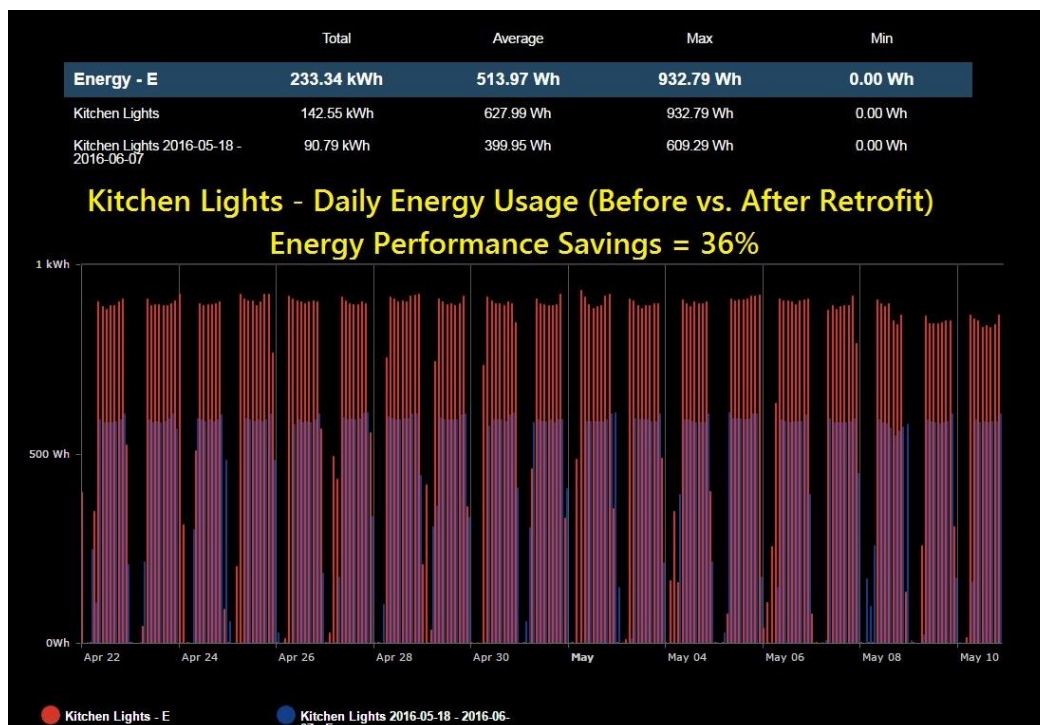
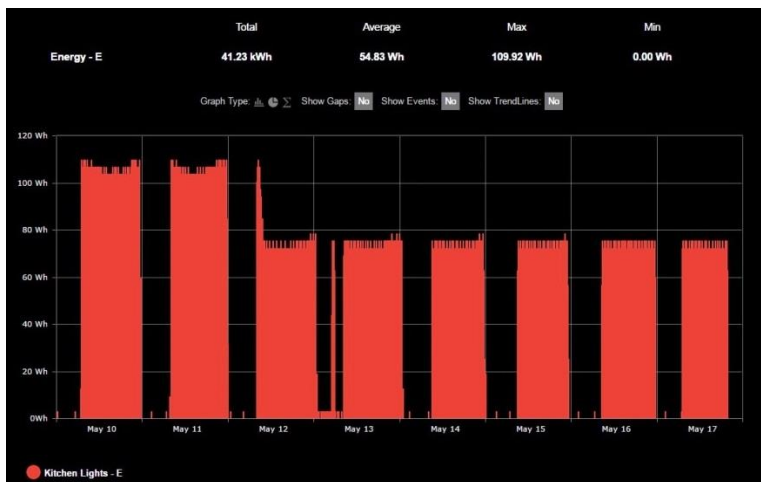
Observations, Results & Recommendations:

- As discussed previously, similar temperature days were selected on a pre and post-retrofit basis for analytical presentation. Results may vary from condenser to condenser but it is felt that the sample period shown above is representative of standard energy saving expectations for the application.
- The Kitchen Walk-in Cooler condenser was recommended for replacement as it is not functioning to the best of its abilities.
- Annually, refrigeration on average accounts for about 25% of the restaurants electric bill. This equates to about \$10,000 (including demand charges). With installation of the chilled unit energy saver in all onsite condensers, it is conservatively estimated that \$3,000 could be created in annual energy costs savings. These savings alone would provide for a hardware ROI of < 5 months.



4. LIGHTING

From May 12th to May 14th, some of the Kitchen fluorescent lights were replaced with LED tubes. The fluorescent tubes were 32Watt, 4000k color (original) and emitted heat. Some of these had already degraded in brightness and color, as evidenced in the picture show here. Presented below is the graph representing the power change after the existing tubes were replaced with 15Watt, 5000k LED tubes, which come with a 10 year Warranty and put off no heat.





- The period of time tested in the graph above shows a date range of April 22nd – May 10th vs. May 18th – June 7th. After careful review of all data, the results shown above are the same today as they were during the testing period. At least a 36% energy and power savings is generated by utilizing LED lighting instead of conventional fluorescent or halogen lighting. Replacing existing lights with energy efficient LED compatible bulbs will easily pay for themselves.
- On average, Lighting throughout the restaurant accounts for about 15-18% of its annual electric bill. The small section of lamps, 18 in total, replaced during this testing phase represents only 10% of the lights within the entire restaurant.
- Continued upgrades utilizing LED's is highly recommended and can be accomplished immediately.

5. ADDITIONAL STUDY RECOMMENDATIONS

The results achieved during this first phase of power benchmarking and retrofit testing of Energy Efficient applications at has been very insightful and positive. We have provided recommendations throughout this report but **our Primary Recommendation is to continue implementing energy efficiency improvements throughout the bar and restaurant.** Lowering energy operating expenses has now been proven to be cost effective. Our next phase of project design and management will be to work with management to phase in additional retrofits in as timely a manner as possible. Some of our key recommendations are:

1. Retrofit the remaining Rooftop A/C unit as well as the 2 Heat Pumps.
2. Retrofit the walk-in cooler back room condenser with another chilled unite energy saving application once the front condenser unit has either been replaced or upgraded. We anticipate similar energy savings for these 2 units as compared to the information presented in this report.
3. All kitchen lights should be replaced immediately with LED tubes. Existing lights in the front of the restaurant prep/cashier area, bar and canned lights in the restaurant booths should be staged out and replaced with LED equivalents as soon as is practical.
4. Replace most, if not all, of the existing Thermostat's in the restaurant with newer, commercial models that will be locked at all times with each management controlling access.
5. Remove the wiring on the existing Kitchen lights being monitored by the Eniscope and replace this with installation of a new set of Connector Ties to the main power feed of the restaurant. This will then give instant feedback on any other changes made to operating systems throughout the restaurant.
6. Energy Experts International will provide to management, a bi-weekly analytics review of existing monitoring results.
7. EEI will work with management to initially setup and edit a real-time energy display feed which will share ongoing energy saving results with patrons of the restaurant.
8. Bi-Weekly reports will be provided by EEI to management concerning ongoing energy management updates and other matters of concern.