

CHALLENGE

Through the Six Sigma internal auditing program, a leading national retailer challenged all departments to identify potential areas for further reductions in ongoing operating costs. The retailer's Energy Committee set out to prove that substantial cost and energy savings could be realized by repairing or installing Occupancy-Based Lighting Control across the entire portfolio of sites with remotely monitored building automation systems (BAS). In order to do so, the actual kilowatt (kW) demand of each lighting load was analyzed, as recorded by the BAS.

The lighting schedules were then compared to the actual occupied time for a sample of sites. This sample showed an estimated average lighting reduction of 18 hours per store per week which would equate to an estimated average saving of approximately \$1,700 per store per year. These findings were presented to and verified by the Six Sigma Lead and then accepted as an actionable project. The goal was to ensure that all sites with remotely monitored BAS would have functioning connections to the security system in order to ensure that all lighting was off once the store is armed.

BEST PRACTICE IMPLEMENTED

By analyzing the actual instantaneous kW demand of each lighting load, it was proven that substantial savings could be gained by implementing the recommended changes across 235 locations nationwide with remotely monitored BAS. Although the existing BAS schedules allowed for varying levels of lighting based on operating hours and employee occupancy, it was determined that there was room for improvement.

Action Taken:

- All sites were verified remotely to ensure that occupancy and intrusion alarm connections to the security system existed and were operational. This ensured that the lighting was only active when the sites were disarmed and occupied or if an intrusion alarm event occurred. The investigation identified 85 stores where the occupancy connections either did not exist or were no longer operational. Of the remaining 150 sites, 120 needed reprogramming to conform to the proposed operating sequence.
- Security suppliers were dispatched to the sites at a cost of approximately \$500 for each of the 85 sites where the security connections did not exist or were not functioning. The monitoring supplier provided automation technical support to ensure the security systems were connected to the BAS, programmed and tested remotely to verify all sites were operational.
- The employee lighting load, which comprised 50 percent of the sales floor lighting and all peripheral non-sales areas, was linked within the programming to the security system occupancy. This ensured that the lighting was only active if the sites were disarmed.
- The customer lighting, which comprises 50 percent of the sales floor lights and display lighting loads, were linked within the programming to the security occupancy and schedule. This allows the loads to only be active if the site was disarmed and scheduled on. The scheduled times were reduced to five minutes before and five minutes after store operating hours.

Timeline:

The lighting load project was one of the first viable proposals selected under the Six Sigma review process. The supporting data, based on the sample analysis, was collected and assessed over the following three months, and then the proposed BAS alterations were approved and implemented. From conception through implementation, the project was set up within six months and remains in effect, and optimized through Enerfrog's continuous optimization program, which ensures that savings are realized on an ongoing, compound basis.

RESULTS OF THE BEST PRACTICE

- The employee lighting load was reduced by an average of 3.5 hours per store per week.
- The customer lighting load was reduced by an average of 6 hours per store per week.
- Total average reduction of 24,480 kWh per store annually.
- Total average reduction of 5,752,800 kWh annually for all 235 stores.
- The return-on-investment, ROI, for the sites requiring dispatch was approximately 2.5 months.
- Based on the original calculations which were verified and approved through the Six Sigma Program, each store would save an average of \$2,448 per year based on a national average energy price of \$0.10/kWh. This would then equate to \$575,280 per year for all 235 stores with remotely monitored BAS installed.
- Since the start of the project, the actual total savings, which is based on the utility bills to the end of November 2013, had accumulated to \$2,013,480 nationally for stores with remotely monitored BAS.

VERIFICATION OF EFFICIENCY AND/OR SAVINGS CAPTURED

Through remote monitoring and analysis of the BAS, the retailer was able to identify areas of potential energy savings and provide the research to justify the recommendations, proving that remote monitoring and continuous optimization are key components to any company's ongoing energy reduction and/or cost-savings strategies. The results of this lighting reduction project have been significant and outline the importance of a properly installed and monitored BAS. Such programs only compound when multiplied on a national basis across a large number of locations, as is evident with the \$2,013,480 accumulated savings realized to November 2013.

The usage reduction mitigates future increases in operational costs should utility rates rise and makes a significant impact on carbon footprint. The project has reduced greenhouse gas emissions by 4065.5 metric tons annually, which is equivalent to 846 passenger vehicles off the road or the energy needed to power 564 homes for a year.

Enerfrog Business Services Inc. provides building automation systems installation, Facility Maintenance, 24/7 automaton monitoring and support for multi-site retail and large commercial buildings.