Energy Conservation Measures (ECMs) Recommended in Multiple Buildings

Energy Systems Group (ESG) has developed a comprehensive program for seven Howard County buildings that include a wide range of Energy Conservation Measures (ECMs). This section provides an overview of the ECMs recommended in multiple buildings. This section was created to minimize redundancy thereby decreasing time for review. The scope of work section in the appendix includes the specific details of the upgrades by building. The ECM description section that follows details the ECMs specific to each of the buildings in this project.

Lighting

Existing fluorescent fixtures will be retrofitted with a reflector kit, which will lead to greater fixture efficiency, while optimizing the lighting energy use. New lamp, ballast, socket and reflector will be provided with the kits. Ballast will be tandem wired in as much as possible, which will reduce the number of ballasts, yielding increased construction and maintenance savings. In general, we propose to replace existing four-foot 32-watt fluorescent lamps with 28-watt units with appropriately matched ballasts.

Existing incandescent lamps will be replaced with compact fluorescent lamps where feasible. Existing fluorescent fixtures that are eight foot (8') lamps will be converted to two, 4-foot lamp system. Depending on the specific application and bay height, high-intensity-discharge lamp fixtures will be retrofitted with either the pulse start energy efficient lamp and ballast kit, or T5 fluorescent, or T8 fluorescent kits.

LED lights will be installed in specified outdoor locations. These LED lights represent cutting edge technology and superior life over the existing HID lamps.

Lighting Controls

ESG proposes to install motion sensors in restrooms, conference rooms, hallways, warehouses and common areas where there is no constant traffic. Office space will have motion sensors if there are more than three fixtures and the occupant traffic showed an indication of being out of the office for long periods of time.

Daylight controllers will be installed in areas where there is daylight available through windows, glass doors or skylights. Motion sensors and daylight sensor locations are shown in the room schedule in the appendix section of the proposal.

Optimize Vending Machine Operation

ESG proposes to install VendingMiser™ on vending machines. A VendingMiser™ is a passive infrared sensor mounted to the vending machine or a nearby wall. This sensor detects movement around the general area of the machine. If after a set time period no movement is detected, then the VendingMiser™ moves into a standby mode of operation. In standby mode the machine is powered down. The display lights are disabled and the refrigeration compressor is taken off-line. The VendingMiser™ unit then monitors the ambient conditions and periodically engages the compressor to keep the product at a usable temperature. Cycle time is based on ambient temperature, meaning that the warmer the ambient temperature, the more the unit will cycle in standby mode.

The VendingMiser™ also measures the machine's current draw so that it will not place the machine in standby mode when the compressor is operating, which would eventually damage the compressor because it would restart under high head pressure. The VendingMiser™ will actually increase equipment life because the compressor cycles fewer times per day.

Tridium Upgrade

ESG proposes to install a Tridium supervisory controller. Tridium is a universal software platform that provides the ability to integrate multiple existing Energy Management Systems (EMS) regardless of the manufacturer, or communication protocol - into a unified platform that can be easily managed and controlled in real-time over the Internet.

EMS Upgrades

This scope of work includes the upgrade of the existing Metasys DDC (Direct Digital Controls) system to include additional EMS functions. This scope affects multiple ECMs and addresses the functions listed below:

Nighttime Setback – Setback space temperatures during the unoccupied time periods to reduce the runtime of the rooftop air handlers. Space temperatures during the summer months can be reset to 80^{o}F or more during the unoccupied periods. Winter time space temperatures can be setback to 60 ^{o}F or below during the unoccupied time periods.

Discharge Air Reset – The cooling discharge air temperature is set to maintain 55^{o}F (typical) supply air temperature to the spaces. However, during periods of reduced loads, the discharge air temperature can be reset up or down to minimize the amount of reheat energy and primary cooling coil energy consumed by the HVAC system.

Economizer Control of Rooftop Units – Outdoor air can be utilized to provide free cooling to the building during time periods when outside air temperatures allow. Utilizing cooler outdoor air to cool the building reduces the need for mechanical cooling and thereby reduces energy consumption. The EMS controls will monitor the outdoor air temperature and based on the interior cooling load, will reset the outdoor air volume to meet the cooling demand.

CO2 monitoring – The demand ventilation control measure will adjust the minimum outside air introduced into the space based on occupancy. As needed, the exhaust fans associated with the air handler will be ramped up or down to maintain proper space pressurization.

ESG proposes to upgrade the existing Johnson Metasys system with new DDC control devices and programming for VSD control, and the start/stop/status of equipment. We also propose programming, commissioning, software, server communications, system engineering and system graphics for the upgrades included in the project.

Building Envelope

ESG uncovered areas where envelope upgrades will increase the performance of the existing building envelope, which in turn will create a more comfortable interior condition and reduce energy loss. Improvements to the building envelope in each of the seven (7) buildings will minimize energy losses and will help reduce leaks to and from outdoors. The energy savings calculations were performed using National Energy Audit (NEAT) software, developed at Oakridge National Laboratories (ORNL) for the Department of Energy.

The general scope of work will include adjustment and/or replacement of weather stripping, sealing penetrations, insulating exposed floor areas by adding insulation foam boards.

Window Film

Window films reduce up to 99 percent of the sun's ultraviolet rays and reject up to 79 percent of the solar heat that may otherwise come through a window. They also help reduce winter heat loss by reflecting up to 35 percent of indoor heat back into the room. ESG proposes to install window film on vertical windows and skylights of selected buildings.