

Energy Conservation Measures and Their Importance to Energy Efficient Design

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All buildings, both existing and new, have the potential to operate more energy efficiently than they currently do. Proposing ways to reduce energy and utility use are called Energy Conservation Measures (ECMs). This article will look at some of the more effective ECMs focusing on non-residential type buildings. Below are four basic types of ECMs along with typical savings and simple paybacks. The ECMs mentioned here are general in nature to show the potential of what can be saved for a typical building. In order to assure the most cost-effective usage and to accurately quantify savings, an energy audit is recommended.



ECM #1 – Administrative Controls: This ECM is in the form of a document issued by the administration of a company laying out parameters for ways to save energy. This can include specifying thermostat setpoints, shutting off lights when leaving a room, keeping windows closed, restricting the use of plug in space heaters, and other things that can potentially reduce energy consumption. This ECM works well for small facilities or businesses. For larger facilities, it can be difficult to enforce, although HODGE has worked with a large school system in the past that had a county wide administrative controls policy. The upfront cost for implementing this ECM is minimal and the savings can be wide ranging depending on the items included and the level of enforcement.

ECM #2 – HVAC Controls: Many existing facilities, especially older ones, still have manual thermostats installed. These thermostats maintain the same setpoint unless manually changed. This means that the space temperature may be maintained at a consistent 72 degrees whether the space is occupied or unoccupied. Installing programmable controls or a building automation system will allow the setpoint to be automatically changed (set back) during building unoccupied hours. For a 30,000 square foot office building, setting back the thermostat by 6 degrees during unoccupied periods could save \$6,000 to \$8,000 per year. A typical payback from installing WiFi enabled programmable thermostats could be 2 years or less. Installing a full building automation system would have a longer payback but could also include added benefits apart from the energy savings.

ECM #3 – Lighting Upgrades: This ECM includes replacing, retrofitting, and relamping existing light fixtures with new technology devices. Lighting technologies have developed significantly over the past century, going from incandescent to fluorescent lamps, the introduction of high intensity discharge (HID) lamps such as metal halides and high pressure sodiums, up to the LED lamps that are prevalent today. Most facilities still include older technology lighting and can see potentially significant energy savings by performing a lighting upgrade. For example, a 30,000 square foot office with primarily linear fluorescent fixtures upgraded to LEDs, could save \$5,000 to \$7,000 per year. A typical payback from a lighting upgrade is 6 to 10 years.

ECM #4 – Building Weatherization: Installing weatherstripping around doors and windows can yield significant energy savings by reducing the amount that the HVAC system has to operate to condition the air that is infiltrated around the frames. The typical payback for this ECM is 2 to 5 years with an annual savings of around \$800 to \$1,000

ECM Honorable Mentions:

- **HVAC Upgrades** – Replacing HVAC equipment with higher efficient equipment provides significant energy savings. This ECM usually has longer paybacks. It is best to perform this task when existing equipment is at the end of its life.
- **Water Conservation** – Older existing plumbing fixtures could see significant cost savings from being replaced or retrofit with low flow devices. The EPA starting in 1992 with several additional iterations since has provided a guideline for what constitutes an energy saving plumbing fixture.
- **Window Replacements** – Replacing existing windows can reduce HVAC load and save significant energy. This ECM can have longer paybacks and would need to be assessed on a case by case basis.
- **Lighting Controls** – Installing automatic lighting controls to adjust lighting levels during unoccupied periods or when abundant ambient light is available could yield significant savings. This ECM would need to be assessed on a case by case basis to provide the most efficient and cost effective solution.