Audubon International

Fact Sheet

Controlling and Reducing Energy Consumption

Energy Use in Buildings

Considerable levels of energy are used throughout buildings for space and heating, cooling, and ventilation (HVAC) systems; pumping and heating water; lighting; and powering equipment and appliances. The conventional production and use of energy (e.g., electrical, liquid fuel, nuclear, etc.) depletes finite resources and leads to harmful pollutants released into the atmosphere (e.g., "green-house gases", smog, etc.). Most building facilities use a combination of electricity (to power lighting, machinery and appliances) and some form of fossil fuel (oil or natural gas; for space and /or water heating) to address their power needs.

Studies show that appropriate thermostat set-backs could result in approximately 10% savings in the energy devoted to temperature control, benefiting both the building and the environment.

Energy Production

Electricity, in turn, must be generated either on-site or by a local utility. Electricity is generated in a variety of ways. Traditionally, hydropower, fossil fuels (oil, natural gas, and coal) and nuclear have been the principal sources. These are all accompanied by significant environmental impacts such as acid precipitation, emission of "greenhouse" gases that contribute to global warming, and photochemical smog formation, depletion of non-renewable resources, waste disposal problems, and site alterations.

Fortunately, more benign generation options (wind, solar, biomass, biogas and geothermal) are increasingly being developed, but are still relatively rare. Regardless of the source(s) of energy employed, using it efficiently will benefit both the building and the environment. This is a prime example of eco-efficiency and is the cornerstone of many building rating and retrofit programs.

For example, the Nordic Ecolabelling Program addresses energy conservation at hotels by setting specific limit values on the permissible use of energy per unit area in Scandinavian accommodation facilities. Only those hotels that meet these stringent requirements may qualify for an Eco-label in those countries. While the Audubon Green Lodging Program approach is less regulatory in nature, it should be helpful to consider these standards as an example of "best practice" to aspire to in your own facility.

Seasonal Thermostat Setbacks

According to research undertaken in Finland, a drop of one degree Celsius (33.8 ºF) saves about 5 percent of energy during heating seasons. Another study estimated that appropriate thermostat set-backs could result in approximately 10% savings in the energy devoted to temperature control. It can be assumed that similar energy savings can result from maintaining higher temperatures during warmer months.

Setting back thermostats is a very appropriate measure for unoccupied office spaces or rooms, such as hotel guestrooms during midday. This may be done by housekeeping or maintenance staff, as part of their assigned duties, or automatically, either with electronic timer thermostats or occupancy sensors. Passive infra-red occupancy detector

controls a motorized valve on the heating or cooling circuits. When an area is occupied, the temperature is brought to comfortable conditions; when the area is vacated and no movement is detected, the temperature reverts to a setback position.

With respect to occupancy or motion sensors, line-of-sight is required for infra-red sensors, with most being sensitive to lateral motion. Ultrasonic sensors don't require line-of-sight as long as hard surfaces are in place to reflect the sonic signal. These sensors are most sensitive to motion toward or away from the sensor. The most reliable (and expensive) sensors are "Dual-Technology" sensors utilizing both ultrasonic and infrared technology. The cost effectiveness of a sensor-control device is dependent upon the wattage controlled and the hours of "shut-off" mode. However, such sensors can potentially save up to 75 percent in storage and washroom areas applications.

Corridor and Public Area Temperature Settings

A strategy for maintaining moderated temperatures in common and transit areas of the building (i.e., cooler than occupied rooms in the winter and warmer in the summer) can also reduce energy demand and lead to financial savings. Implementing this strategy is generally somewhat simpler than the above measures, as complicated controls are unnecessary. All that is required is the capability of maintaining distinct temperatures in such common areas.

Advanced Room Control System

In the case of hotels, there is emerging technology that enables energy control from the reception area. Hotel room keys are fitted with special attachments which, when slotted into the key console, turn off services to the relevant rooms. When a key is removed and handed to a guest, the services are reactivated and the heating and hot water system starts to operate.

At the Royal York Hotel in Toronto, an energy performance contracting arrangement with Johnson Controls, involving a comprehensive computerized control system, saves over $500,000 annually in energy costs and had a four year payback period. Another option is an electronic key card which can be used in place of an ordinary key to unlock the guest room door. Once inside, the guest slots the card into an energy control unit located on the wall. This activates the heating or cooling and all lighting and power services within the room.

While the key card system costs about $21 per unit, estimated savings are approximately $0.30 per day per room, making the payback period 70 days. If capital costs to install such systems are too high, then regimented, manual monitoring and control of HVAC and lighting systems is the next best option. If no one is assigned to this task, it may not be carried out (e.g., staff members assume someone else will handle it). This is "extra work" for someone, but the savings make it quite worthwhile.

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Sequential Room Assignments

Assigning rooms in a hotel, apartment building, or hospital sequentially means to use them in blocks (i.e., by floor, or other common-service area) rather than randomly. This improves overall operational efficiency by enabling the reduction of HVAC energy requirements, since only occupied areas of the building need to be fully serviced. Other areas can have equipment and appliances turned down or off until needed. It doesn't make good environmental or economic sense to heat, ventilate, or cool large areas that have limited or no occupancy.

Bathroom Exhaust Fans

A simple method to prevent excessive running of fans is to wire them to the light circuits. While limiting running time, this still ensures that some ventilating of the area is being performed to remove odors, airborne particles, etc. Whatever manual or automatic measures are implemented, staff must receive direction or instruction to ensure that optimal savings are achieved.