



# Top Low-Cost & No-Cost Energy Efficiency Tactics for Buildings

*HVAC Version adapted from BOMA's BEEP Program*



## 1. **Reduce After Hours Usage of HVAC & Lighting**

After hours usage is sometimes unavoidable, but blatant “on” equipment and lighting during unoccupied times is never by design. Talk to the tenants to learn if they are actually using their space during the lease-required operating hours, measure actual schedules using data logging equipment and adjust building operating hours to reflect actual tenant usage.

## 2. **Optimize Start-Up Time and Equipment Sequencing**

Optimize the start time by turning on your equipment as late as possible in the morning to reach the desired set point when tenants enter the building. Sequence the equipment in the building over a half hour or so to lower the peak demand.

## 3. **Coast the Last Hour of Operations**

Understanding your building’s occupancy schedule as in #1 may allow you to turn off heating and cooling equipment during the last hour of occupancy. Be sure to maintain ventilation rates within code as you optimize the staging of systems off. The time may be different on Fridays, for example, if people leave early for the weekend than it is earlier in the week.

## 4. **Outside Air Temperature Lockout**

To avoid the painful cost of simultaneous heating and cooling, institute an outside air temperature lockout that does not allow the heating system to operate above a certain outside air temperature. The same idea can be applied to the cooling system, close to the edge of the ideal free cooling times for your economizer.

## 5. **CW/HW Supply Resets**

Reset the chilled water supply (CW) and hot water supply (HW) based on outside air and supply air temperature to use the minimum amount of energy to satisfy the set points. Like many of these measures, some amount of trial and error may be needed for your specific building.

## 6. **Supply Air Resets**

To avoid unnecessary cooling and reheat issues, use a strategy of resetting the supply air temperature to the maximum temperature needed to cool the space to the set point desired.

## 7. **Economizer Tune Ups**

Be sure your economizer controls are tuned and operating correctly to take advantage of the maximum amount of free cooling possible.

## 8. **Lighting Occupancy Sensors**

The installation and use of occupancy sensors for reducing operating hours for individual zones or offices can have a meaningful impact on energy use. A salesperson’s office, which is only occupied for an hour every morning prior to making calls does not need lights on all afternoon.

## 9. **Daylight Controls on the Perimeter**

In a building with great perimeter light from large windows, adding daylight controls to specific light fixtures can reduce their use dramatically in the same way occupancy sensors can.

**10. Adjust Dampers**

Reduce outside air by adjusting dampers to minimize the need to condition outside air, but be sure to stay within codes requirements to maintain optimal Indoor Air Quality. Where code permits, close outdoor air dampers during the first and last hours of occupancy to permit fast warm-up and cool down creating a synergy with scheduling of building equipment.

**11. Adjust Ventilation**

Reduce exhaust and outdoor-air ventilation rates within codes using a carbon dioxide sensor for control. Take a look at the fans and adjust ventilation in unoccupied and low-density areas to reduce the ventilation to a practical, yet comfortable level. Regularly inspect and repair ventilation equipment, especially be sure the dampers have proper seals and adjust controls to ensure complete closure.

**12. Static Pressure Reset**

Automatically adjust the pressure inside the duct to minimize the amount of fan energy by maintaining the static pressure only as high as needed to meet minimum airflow requirements for all zones.

**13. Adjust Temperature**

Physically walk through the building and talk with tenants to determine if the actual temperature is comfortable. Make sure that the temperature you have in the building is what tenants need, and measure the space (with proper tools) to identify that the set points are being met. Re-examine what was contracted for in the lease—it may be too cold or too hot for the tenants' comfort.

**14. Raise the Indoor Setpoint During the Cooling Season & Maximize Setback**

Has anyone walked into an office during the summer and felt cold? Summer clothing is typically lighter, thereby requiring less AC to keep the tenants comfortable. Allowing the building to float the temperature overnight with a possible early morning purge keeps you from cooling after hours.

**15. Lower the Indoor Setpoint During the Heating Season & Maximize Setback**

Consider a lower set point in the winter months as winter clothing is heavier, thereby requiring less heat to keep the tenants comfortable. In addition, you should be able to reduce thermostats by a minimum of 10 °F at night, or weekends and holidays during the heating season

**16. Calibrate Thermostats**

Periodically walk through the building and compare the thermostat setting with a hand-held digital thermometer (preferably one measuring to 2 decimal places – not the IR version which is inaccurate). Ensure thermostat setting equals actual space temperature by using a NIST calibrated sensor. This will also reduce the number of dueling zones and decrease the occurrence of simultaneous heating and cooling.

**17. Relocate Thermostats to Optimal Locations**

Install or relocate thermostats near return air ducts. Locate thermostats in a place that will give you the readings that you want to send to your HVAC system. Thermostats, though often originally located in optimal locations, because of tenant improvements and a variety of other changes to the building over time, end up in less than optimal locations.

**18. Limit Access to Thermostats**

Consider using pre-programmed range stops, or locking covers on thermostats that are accessible to tenants to prevent tampering. Providing a few dummy thermostats is good for allowing the

perception of control for the tenant, which has been shown to improve productivity along with providing a comfortable working environment.

19. **Install Variable Frequency Drives and Variable Air Volume Systems**

Motors and fans may not need to run at full speed at all times, due to varying levels of demand placed on the system at different points throughout the day.

20. **Employ Heat Recovery Strategies**

The goal is to optimize the conditioning of ventilated air by recovering heat that is being produced by other heat producing equipment in the building. Example: Enthalpy wheels transfer heat and humidity between the exhaust and supply air. Their net effect is to bring the supply (incoming) air closer in temperature and humidity to the exhaust air and reduce the load on the heating and cooling systems.

21. **Tune Up Equipment**

Regularly inspect all equipment and controls to ensure they are functioning as designed. Double-check EMS programming to make sure that operations are optimized. Example: one firm corrected an EMS software programming error from “And” to “Or” and saved \$3,700 annually.