

## HVAC (Heating, Ventilation & Air-conditioning)

HVAC (pronounced either ‘H-V-A-C’ or ‘H-VAK’) is an acronym that stands for “heating, ventilation and air-conditioning.” Often installed into a single system, these three functions of the HVAC system are closely interrelated to provide thermal comfort and to maintain good indoor air quality. HVAC is sometimes referred to as climate control because it provides heating, cooling, humidity control, filtration, fresh air, building pressure control, and comfort control.

HVAC is one of the largest consumers of energy in the hospitality industry, constituting approximately 30 percent or more of total costs. HVAC systems that operate properly are essential in lodging facilities and contribute to employee productivity and guest satisfaction.

Because HVAC systems account for so much electric energy use, almost every facility has the potential to achieve significant savings by improving its control of HVAC operations and improving the efficiency of the system it uses through proper design, installation and scheduled maintenance. The following sections outline some important components of the HVAC system as well as offer suggestions to improve your facility’s efficiency.

### 1. Get an HVAC Tune-up

It is recommended that you schedule maintenance on your heating and air conditioning systems twice annually by a licensed HVAC contractor. Although some maintenance jobs can be accomplished inexpensively using in-house staff, others may require calling an outside technician. These maintenance and system checks are important to maintaining the performance of your system, similar to changing the oil in your vehicle every 3,000 miles. The HVAC tune-up should do the following:

- **Replace air filters regularly:** Accumulated dirt and dust make your fans work harder. Clean filters help system performance, increase equipment life and help reduce allergens in your building.
- **Clean heat-transfer coils in heat pumps, air conditioners and chillers:** Make sure that leaves and plants are not obstructing outdoor coils and have any bent coils straightened. In addition to saving energy, this will also increase the capacity of your system.
- **Inspect ducts and piping for leakage and missing or damaged insulation:** Insulation is especially important in unconditioned spaces and leaky ductwork is one of the biggest contributors to cooling loss in buildings.
- **Make sure that furniture or other obstructions do not block air flow around radiators, convectors or air intakes and diffusers.**
- **Identify any areas in your facility that are unused but are being conditioned:** Consider turning off the HVAC to these areas or closing the vents.
- **Have your fuel-fired boiler or furnace checked out at least annually, before the heating season starts:** Have the technician check the combustion efficiency and report the results along with any suggestions for improving boiler efficiency.

- **Repair old valves and steam traps:** A steam trap costs about \$50.00. If broken it can waste hundreds of dollars each winter. Some suppliers estimate that anywhere from 20 - 60 percent of traps nationwide have failed. Failed steam traps not only waste money and energy, but they also cause extreme occupant discomfort.
- **Inspect and oil fan motors:** Replacing older or failed motors with more efficient models can result in significant savings.

## 2. CHOOSE MORE EFFICIENT TEMPERATURE SET POINTS

Substantial savings are also available by adjusting your temperature setpoints — lower setpoints in the winter and higher temperature setpoints in the summer. Make the changes gradually, no more than one degree per week, to see how low (or high) a setting you need to maintain a comfortable facility. Try to make the changes without announcing them to your staff to avoid complaints about temperature change before employees can actually feel the difference. This can also help to identify an appropriate comfort level for your facility.

## 3. TURN OFF OR “SET BACK” THE HVAC SYSTEM

The most clear-cut method to save on your HVAC bill is to simply operate your system less. This can be done either by turning the system off or setting it back when the building or building section is not occupied. Setting back your thermostat means changing the temperature setting (setting back to a lower temperature).

For example, a week contains 168 hours. If your business operates during 40, or even 80, of those hours, you occupy your facility during only a fraction of the week. You can minimize your HVAC usage by turning down your HVAC settings in all or some of your building during unoccupied hours.

## 4. TURN THE FAN SWITCH ON THE THERMOSTAT TO “AUTO” RATHER THAN “ON.”

If the fan on the thermostat is left in the “on” mode, it runs nonstop 24 hours per day. In “auto” mode, the fan runs on only when heating or cooling is being supplied. Even if temperature setback changes are minimal, fan adjustments can be significant. If your system draws in ventilation air from outdoors, cycling the fan on “auto” can also help with humidity control.

## 5. INVEST IN A PROGRAMMABLE THERMOSTAT

Although night-setback and temperature-setpoint changes are simple enough to be done manually, an automatic control is much more efficient and reliable. Electronic, programmable thermostats allow you to program in desired setpoint and cutoff times for a 7-day week. Be sure to place the thermostat in a location where the temperature is

representative of the entire area served by the system—not next to the air-conditioning, heat vent, drinking fountain, computer or other electronic equipment. Many businesses find it worthwhile to install a locking enclosure around their thermostats to avoid unauthorized tampering with the setpoints. The table below summarizes potential savings from thermostat setback.

<b>Approximate Percentage Savings From Thermostat Setback</b>			
<b>Region</b>	<b>Setback Temperatures</b>		
	<b>60° F</b>	<b>55° F</b>	<b>50°F</b>
<b>Mid- to Northern Michigan &amp; U.P.</b>	5-7%	9-15%	14-22%
<b>Southern Michigan</b>	7-9%	15-19%	22-28%
*Savings based on 65° F and assuming setback for 14 hours/weeknight and all weekend Source: "Reducing Energy Costs Means a Better Bottom Line." National Frozen Foods Association/U.S. Department of Energy			

## 6. ENERGY MANAGEMENT SYSTEM (EMS)

Programmable thermostats are effective and work quite well, especially with individual-unit air conditioners and heaters. If your facility uses larger, central systems such as boilers and chillers, you may wish to use an energy management system (EMS). These systems are capable of controlling many different functions in a building. Some automatic control features include:

- Adjustment of supply-air temperatures based on indoor and outdoor temperature and humidity to let heating and cooling systems operate most efficiently
- There may be times when you need cooling in the building but the outside temperature is low. With an economizer mode, your system can circulate outdoor air for free cooling during these periods.
- Implementation of holiday period automatic setpoint adjustments
- Automatically adjust air intake and temperature based on occupancy
- Monitor space temperatures to minimize overheating or overcooling of spaces in a zone-by-zone basis

An EMS can be used to control other functions in your building as well, such as lighting, fire suppression and security. It can manage your electric loads, prevent peak loads and optimize your electrical rate with your electric utility.

EMS suppliers typically estimate that an EMS can cut the heating and cooling bills of a business with a central chiller and heating system by 10 to 50 percent, with many estimates clustered around the 20 percent range.

## 6. Purchasing or upgrading an HVAC system

Due to high costs of large HVAC equipment, the energy savings alone may not justify replacement of equipment that is in good working order. If your equipment requires frequent repairs or is nearing the end of its life expectancy, however, it may be wise to consider replacing it from a preventive maintenance standpoint and an energy savings standpoint. A scheduled replacement can generally be negotiated at a lower cost and with less inconvenience than the emergency replacement of a failed unit.

If you plan to upgrade any heating or cooling equipment, be sure to do this after other energy upgrades have been implemented. Earlier upgrades (such as lighting replacements or building construction improvements) may result in a change in size requirements for your new HVAC system.

Never buy oversized HVAC equipment on the theory that more capacity is better. Grossly oversized heating and cooling equipment will cycle too often and will be unable to sufficiently dehumidify your space, which creates a serious comfort issue. It will also cost more to run annually.

## 7. RESOURCES FOR HVAC

- **Alliance to Save Energy:** Information about HVAC systems specific to the hospital-ity industry [http://www.ase.org/section/topic/ee\\_hotels/hotel\\_hvac](http://www.ase.org/section/topic/ee_hotels/hotel_hvac)
- **U.S. Department of Energy:** Description of basic components of an HVAC system and how to maximize its efficiency <http://www.eere.energy.gov/buildings/info/components/hvac/>
- **ENERGY STAR<sup>®</sup>:** Information about heating and cooling management, products and maintenance [http://energystar.gov/index.cfm?c=heat\\_cool.pr\\_hvac](http://energystar.gov/index.cfm?c=heat_cool.pr_hvac)
- **ASHRAE:** American Society of Heating, Refrigerating and Air-Conditioning Engineers [www.ASHRAE.org](http://www.ASHRAE.org).