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Cut Energy Bills in High-Rise Restrooms

Leah Grout Garris | April 9, 2015



Even though the focus of most restroom projects is water conservation, that doesn't mean energy-management improvements aren't also possible. Because restrooms are usually located in the core of taller buildings, solar heat gain and heat loss through outside walls aren't major culprits. But restrooms still consume their fair share of energy thanks to the hot water, exhaust fans, and lighting systems that are used on a daily basis.

The biggest problem Jeffrey Salay, principal, Building Energy Services Section Head, at GHT Limited, notices when it comes to energy efficiency in commercial restrooms is lack of equipment schedules. "The first thing to do is determine which schedule the equipment is on – if any," says Salay. The goal is to make sure system operation matches building occupancy.

Once you determine how the restroom space is operating, then you can examine individual systems for energy-efficiency opportunities. Here are a few commercial restroom systems to watch closely if you want to keep energy savings in check.

Airside Systems

Because there's not a lot of heating and cooling required in a restroom, money doesn't need to be spent on preconditioning air for the space.

"You can use air that was already conditioned and then transfer it through," says Michael Frank, director of engineering at McKinstry. "Our current standard is putting in a transfer opening from the adjacent space into the restroom and exhausting that air out of the restroom – drawing preconditioned air in and exhausting it." Using transfer air in place of preconditioned air will save energy and operating costs.

Occupancy Sensors & Lighting

Commercial restrooms tend to be overlit. A quick way to tell if this is true in your facility? Purchase a light meter for around \$100 to measure lighting levels (this device can be used all around your facility – not just in your restrooms), and compare them to the standards set forth by the Illuminating Engineering Society. This will tell you whether you need to delamp or shut some fixtures off.

Then investigate lighting controls and sensors. If you don't already have them in place, installing sensors can be an easy way to experience immediate energy savings. In fact, according to ENERGY STAR and Rensselaer Polytechnic Institute researchers, commercial restrooms may be the best place to install these devices: The researchers' study found that sensors can save between 47 and 60 percent of restroom lighting energy costs.

Lou Vogel, president at Taitem, suggests using more than one occupancy sensor in each restroom, especially if the area is designed with multiple banks of lights or has separate sink and toilet areas.

“If somebody comes in to wash their hands or use the mirrors, for example, then you’d ideally want a sensor that only turns on a couple small lights in that area,” says Vogel. “If the person moves back into the toilet area, then sensors can turn on another bank of lights.”

He also recommends checking settings on existing occupancy sensors. The typical sensor can adjust up to 15 minutes, Vogel explains, but setting them to turn off within a minute (or less) of someone leaving can have a significant impact on energy usage.

If possible, Salay suggests taking lighting control one step further by adding the capability to shut off individual floors at a time, especially if they run on different schedules (some floors may be vacant, some may have different occupancy levels, etc.).

Exhaust Systems

“Over the years, the amount of exhaust airflow or makeup air required for a restroom per fixture has dropped,” says Frank. If your facility is 15 to 20 years old and has a large restroom, chances are good that the space is over-exhausted. (Codes differ depending on whether restrooms ventilate continuously or intermittently.)

If you discover that your restrooms are over-exhausted and you don’t want to replace the fans, installing a variable frequency drive on existing fans may be possible in order to bring fan operation down to current code requirements.

Similar to lighting, exhaust fans don’t need to operate 24/7; make sure they’re on a timer or sensor that shuts the fan down when the room is unoccupied. Vogel says one option is to connect the exhaust fan to an occupancy sensor – but just keep in mind that runtime may need to be adjusted in order to provide adequate time to clear the room of odors.

“If at all possible,” says Vogel, “you also want to have a separate exhaust fan for each bathroom, which is not always done with high-rises.” Quite often, a riser duct with a large rooftop fan is used, and runs all day long. But not all floors may need exhaust. If the fan runs all day, the air on all floors is exhausted – whether it was necessary or not.

Hot Water Systems

Depending on the occupants in a commercial tower, domestic hot water can make up 10 to 15 percent of a high-rise’s total energy bill, says Goran Ostojic, managing principal at Integral Group.

Tank-style heaters can help lessen energy demand from domestic hot water, thanks to a smaller-demand heater with a bigger storage capacity. “Keep in mind that you’re spending money to heat up that tank,” explains Frank. “Mechanical rooms usually aren’t located right next to the restrooms. So you need a circulation pump to get that hot water to your fixtures and back.” He recommends connecting the pump to the building control system so it’s not running 24/7, continually pulling heat out of the tank and dissipating it through the lines.

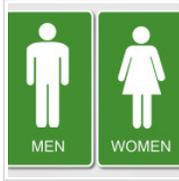
Your building’s electrical and gas service may also influence what type of energy-saving strategies are possible when it comes to hot water systems. Instantaneous point-of-use water heaters used under sinks or for small batches of fixtures offer the lowest energy use, Frank explains, but you should first ensure that you have the electrical capacity available to power these types of water heaters in the first place.

“More and more, we’re doing instantaneous heaters,” says Ostojic. “Capital savings is the big reason, because you’re not having to distribute from the domestic hot water system. These systems have no storage tank, so there are no standby losses. It’s only cold water distribution with a small instantaneous heater that specifies the domestic hot water requirements.”

Commercial restrooms offer many opportunities for energy savings. If you’re in search of new ways to reduce utility bills and diminish your high-rise’s environmental footprint, this often-overlooked space can be a good place to start.

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