

Hospitals Realize Fast Paybacks from Retrofits and O&M Solutions

The energy efficiency of existing hospital buildings can be greatly improved through relatively simple and inexpensive retrofits and operations and maintenance (O&M) solutions. Often, these have very short payback periods, building credibility with upper management and serving as the foundation for an energy management program.

This fact sheet has been developed by the U.S. Department of Energy's Hospital Energy Alliance to help building owners and operators use effective, energy-efficient technologies and practices to decrease energy consumption and its related costs.

While hospitals realize the most savings when energy-efficiency measures are part of a comprehensive energy management program, most actions highlighted here can be undertaken independent of each other. They encompass five areas where there is great opportunity for quick energy-efficiency upgrades: lighting, HVAC, building envelope, plug loads, and water.

Lighting

The following actions offer a fast return on investment. Many also have a positive effect on patient care.

- Upgrade all exit signs with light-emitting diodes (LEDs).



Many hospitals today are designed and constructed for energy efficiency, but this hasn't always been the case. There are numerous measures owners and operators can take to improve the energy efficiency of existing buildings—both for the short and long term.

- Replace older T12 fluorescent lamps with “super” T8 lamps and high-efficiency electronic ballasts.
- Replace incandescent lamps with efficient alternatives. Compact fluorescent lamps (CFLs), for example, use a quarter of the electricity and last up to 10 times longer.¹
- Install occupancy sensors in spaces that are frequently unoccupied, such as restrooms and stairwells with dimming or bi-level switching. Consider safety needs before installing occupancy sensors or timers in work areas. Ensure that the sensors are appropriately matched with lamp and ballast combinations to prevent premature failures.
- Use daylighting sensors in patient rooms and public spaces with large windows, such as lobbies and meeting rooms.
- Track maintenance on different types of bulbs and ballasts. Identify consistency issues (such as light-quality fluctuations) and manufacturing

problems (such as ballast defects) that may waste energy or cause the bulbs to fail prematurely.

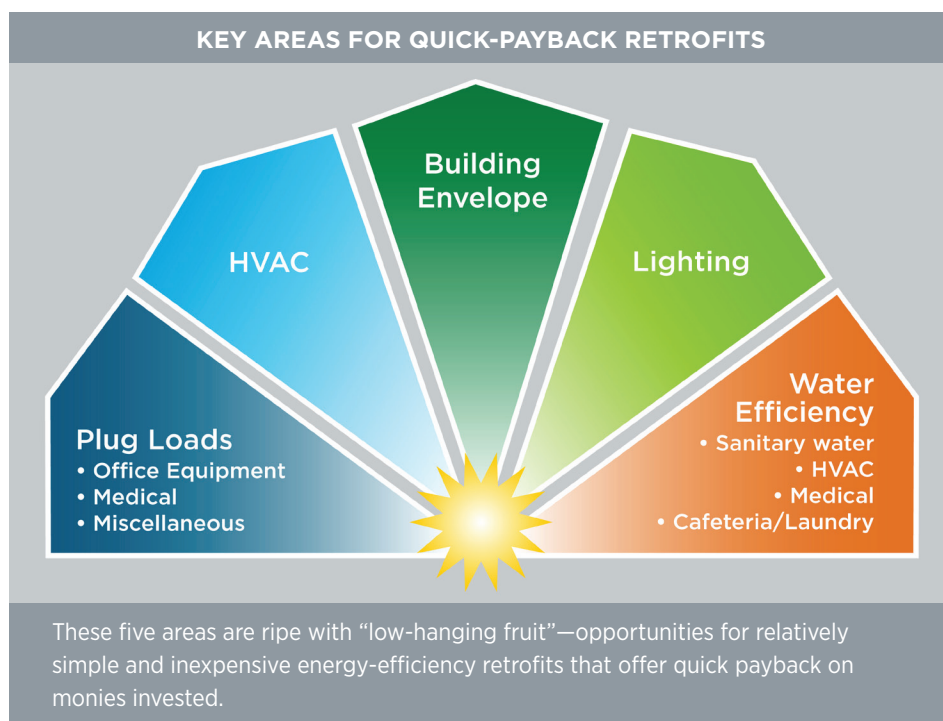
- Adopt a period of “downtime” lighting. Reducing the overall lighting levels allows patients to rest.

HVAC

A hospital's heating, ventilation, and air conditioning system represents a major percentage of the building's energy consumption—and energy costs. The monitoring and maintenance activities that follow should be conducted regularly.

- Calibrate, check, and adjust thermostats to heat and cool different building zones. Implement setback strategies to reduce HVAC use when areas are unoccupied or have low use.
- Schedule and perform regular maintenance on key HVAC units.
 - Clean or replace filters and dampers.
 - Inspect ducts and pipe insulation for damage. Repair or replace as needed.

1. http://www.energystar.gov/index.cfm?fuseaction=find_a_product.



- Improve performance of heating and cooling systems.
 - Clean heat transfer coils on chillers, heat pumps, and air conditioners.
 - Monitor Delta-T (ΔT) on the chilled water system. This helps to identify controls problems.
 - Clean boiler tubes and combustion surfaces of fouling.
 - Install automatic blow down controls on boilers.

Building Envelope

An energy-efficient building envelope reduces the load on a facility’s mechanical systems, decreasing energy consumption. Listed are a few methods for improving the building envelope.

- Repair or replace leaky windows and doors.
- Check caulking and weather stripping regularly for leaks.
- Keep external doors closed whenever possible. This is especially important during high- and low-temperature periods.

Plug Loads

The energy drawn by office and medical equipment and appliances can add up to a significant portion of a hospital’s energy usage. Here are some ways to limit consumption.

Office Equipment

- Unplug—or provide accessible power strips for—non-essential equipment, such as battery chargers, desk lamps, and coffee makers when not in use. This eliminates phantom loads.
- Consolidate equipment and avoid redundancy.
- Connect printers in a network to reduce the number of personal printers.
- Use copiers, computers, printers, fax machines, and external power adapters rated by ENERGY STAR®. On average, these use significantly less electricity than unrated equipment.²
- Enable power management settings, as available, on all equipment.
- Replace CRT monitors with LCD monitors. This reduces energy use by 25 to 60 percent.³
- Evaluate LED replacement opportunities, such as accent or task lighting.

Medical

- Reduce loads of major diagnostic equipment, such as MRI units, linear accelerators, and automated patient monitoring systems. This may be accomplished by using energy-saving settings during working hours, if available, and by turning off devices during any appropriate non-working hours.

Miscellaneous

- Install sensor-based controls on vending machines.
- Use variable air volume kitchen hoods. These adjust exhaust system air volume as needed, rather than always running at full capacity.

Water Efficiency

Hospitals save energy by using water efficiently—including sanitary water and water used by the HVAC system, medical equipment and processes, cafeterias, and laundries. Decreasing water usage directly reduces the energy required to pump water into the building and to heat and cool water in boilers and chillers.

Sanitary Water

- Check for and repair leaks in showers, faucets, and toilets.
- Install low-flow showers and laminar-flow faucets.
- Utilize toilet technologies such as dual-flush toilets, pressure-assisted toilets, and no-flush urinals.

HVAC

- Install insulation around domestic hot water tanks and pipes.
- Adjust blow down rates on the boiler and cooling tower. Optimize to maintain necessary water quality.
- Check and repair steam traps.
- Upgrade and properly seal pumps and compressors.
- Evaluate installation of demand (point-of-use/tankless) water heaters.

Medical Equipment and Processes

- Install automatic valves on film-processing systems for X-ray

2. http://www.energysavers.gov/tips/home_office.cfm.

3. Ibid.

equipment. This stops water flow when equipment is not in use.

- Reuse single-pass cooling water for other uses, such as makeup water for the boiler and/or cooling tower, if water quality requirements can be met.

Cafeterias and Laundries

- Train staff in more efficient operation of cleaning equipment in kitchen and laundry areas.
- Upgrade to water-efficient, ENERGY STAR-rated equipment.
- Use gray-water recycling dishwashers and washing machines.
- Adjust equipment settings to ensure water- and energy-efficient operation. Combination ovens with multiple cook modes and pre-rinse spray valves for dishwashers, for example, aid in efficiency.
- Wash and dry full loads of laundry.
- Turn off dishwashers when not in use.

Creating an Energy Management Plan

Though individual energy-efficiency measures can reduce consumption significantly, a comprehensive energy management system helps hospitals to proactively control energy use. Such a program enables hospitals to accurately measure energy usage and savings, receive alerts for preventative maintenance, and create an energy-efficiency mindset.

Case Study



Rush Oak Park Hospital

Oak Park, Illinois • 2008–2010

Rush Oak Park Hospital is a 526,569-square-foot community hospital with 246 authorized beds. The hospital, located just outside of Chicago, embarked on a program to reduce energy-consumption costs and promote staff stewardship of resources. A combination of educational and technical measures have been employed, with several of the hospital's relatively inexpensive and "faster payback" strategies highlighted below.

Details

- Secured a new lighting vendor, resulting in 50 percent savings; redirected savings to energy-efficient lighting.
- Replaced 90 percent of incandescent bulbs.
- Purchased T8 bulbs and electronic ballasts to replace T12s and non-electronic ballasts.

- Replaced various exterior lamp fixtures through a Homeland Security Grant.
- Educated staff to stagger equipment turn-on by 31 minutes to prevent energy peak.
- Educated staff to start chillers prior to peak.
- Instructed security to switch off nonessential lighting after visiting hours.
- Set building control system to shut down air-handling units in nonpatient areas after hours and on weekends

Benefits

- Realizing a 30 percent savings through conversion to T8 bulbs. Using bulb and electricity savings to cover the cost of new electronic ballasts.
- Increased exterior lumens by 50 percent while reducing energy consumption by 26 percent.
- Saved more than \$340,000 in the first nine months of the 2010 fiscal year.
- Earned the Environmental Protection Agency's ENERGY STAR® label by ranking among the top 25 percent most energy-efficient hospitals nationwide.

Hospital Energy Alliance

HEA is a forum in which healthcare leaders work together with DOE, its national laboratories, and national building organizations to accelerate market adoption of advanced energy strategies and technologies.

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.