



## ENERGY CHALLENGE: Hospitals

In newspapers, articles on “skyrocketing healthcare costs” often run side-by-side with articles on “soaring energy costs.” In the hospital environment, these two go hand-in-hand with energy costs driving up the cost of patient care.

Hospitals represent complex systems in which subsystems - cooling, power, lighting, water - are critical. Yet, when these essential infrastructure systems aren't operating at maximum efficiency they unnecessarily drain funds from direct patient care.

Even in a relatively new facility, constantly changing technologies create opportunities to reduce energy use. The list of systems to evaluate is virtually endless and could include everything from how vending machines operate to power plant operations. But consistently, there are three areas that offer a high return on relatively simple energy-efficiency retrofit projects:

- HVAC
- Lighting
- Windows

### HVAC

Significant savings can be derived from creating efficiencies in hospital HVAC systems, which consume the most energy of any system. People, electronic equipment and lighting operating 24/7, and solar heat gain through windows add significantly to the cooling load.

In a hospital audit Advanced Energy Innovations led, modifying the chilled water distribution system showed annual energy savings of nearly \$300,000. Additional savings on maintenance and reduced water and chemical use added to that significantly.

Problems with the system were typical: low delta T (when primary and secondary flow are not balanced), inability to fully load chillers, and oversized pumps. Simply put, the system was inefficient operating at less than maximum load.

The crux of the solution was implementing all-variable speed principles to the chilled water plant and distribution system in addition to some equipment upgrades. Variable frequency drives (VFD's) were recommended on all condenser pumps, tower fans, and the chiller.

The estimated savings delivered payback in just over one year:

Project Cost	\$846,000	
Utility Company Incentive	\$526,823	
Out of Pocket	\$319,177	
Annual Energy Savings	\$292,138	1,151,700kW
Cost w/incentive and savings		\$27,039

### Lighting

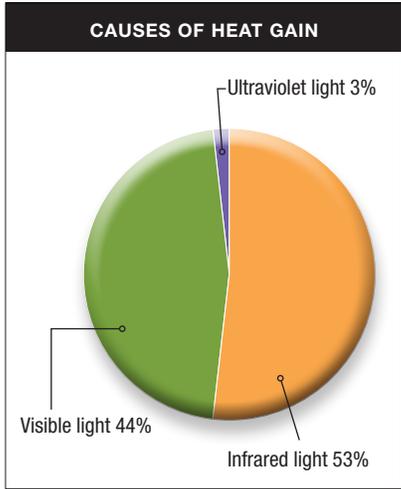
In an environment that's lit 24/7, installing energy-efficient lighting can create immediate bottom-line impact. Energy consumption can be reduced in every area, from underground parking garages to administrative offices, simply by upgrading lamps, ballast, fixtures, or switches.

The hospital saves on energy lighting draws, but also by reducing demands on the HVAC system. A single watt equals 3.14 Btu's. Energy-efficient lighting minimizes heat generated, immediately reducing cooling costs by 25% or more.

A San Diego area hospital worked with Advanced Energy Innovations to improve lighting and reduce energy consumption in its physical rehabilitation clinic. A fairly small installation at 180 fixtures, it is reducing energy expense for lighting by 75%. Combined with significantly reduced maintenance and cooling expenses, the hospital is seeing payback on the project in under two years.

	Current	AEI
Energy expense	\$9,246	\$2,311
Relamping	\$2,717	\$529
Annual operating expense	\$11,964	\$2,841
Annual savings		\$9,122





**Windows**

Most hospital buildings have high-efficiency windows, either as part of their original construction or installed later as retrofits. Yet, with today’s advanced window films, there’s opportunity to improve efficiency even more and bring the added benefit of UV protection to hospital staff and patients.

Daylighting interiors with natural sunlight reduces energy use for lighting, yet because of heat gain, increases demands on cooling systems. New window films allow daylight in while reducing solar heat gain and blocking harmful UV rays.

Factors to consider in selecting film include:

- **Visible Light Transmission (VLT).** This is the amount of visible sunlight transmitted. A high VLT equals more light entering. VLT’s range from 12% to 72%, which is a visually clear film. Since visible light contributes 44% of solar heat, lower VLT’s equal higher heat rejection.
- **Infrared Light Transmission (IR).** Infrared light is the primary cause of solar heat, contributing 53%.
- **Ultraviolet Light Transmission (UV).** Contributing only 3%, UV isn’t a significant factor in solar heat gain. But UV is the primary contributor to fading and damage to interior furnishings. It’s also a primary cause of skin cancer. Some films block over 99% of UV light.

Based on an estimated average of saving 1 kWh per square foot of film, an installation of 10,000 sq ft of film on south and west facing windows would produce annual energy savings of \$15,000 to \$20,000, depending on cost per kWh.

The most significant gain, however, is in comfort. Patients and employees alike can enjoy natural sunlight without the discomfort of hot spots and dangers of UV exposure.

**Incentives improve payback**

Federal, state, and local utility incentives can dramatically reduce out-of-pocket on energy efficiency retrofit projects. EAct, or the Environmental Policy Act, offers a one-time tax rebate. Bundling several retrofits, such as HVAC, lighting, and film, as a single project yields the highest rebate.

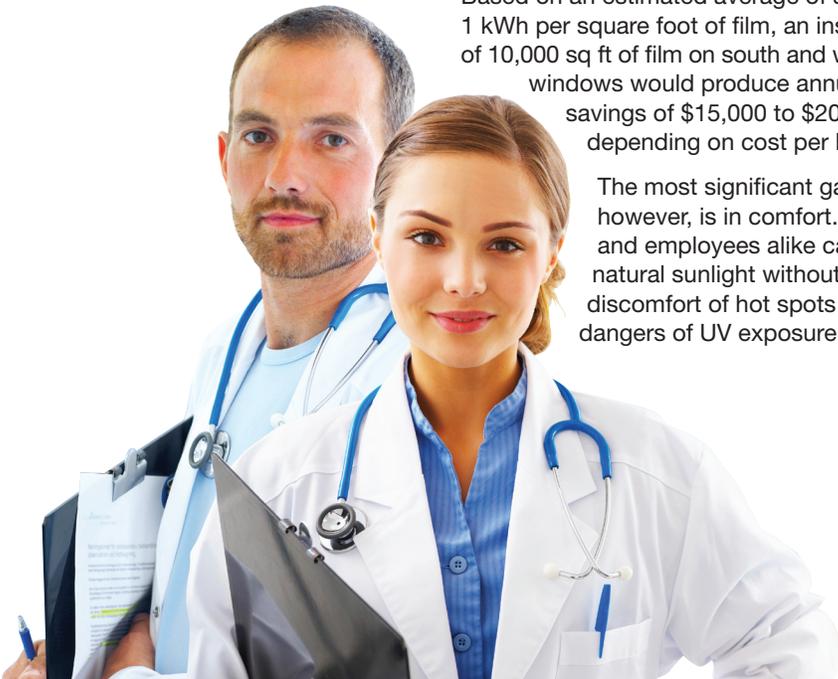
Some utility companies offer higher incentives for reaching specific energy-saving thresholds, so again, bundling can lower the total project cost and deliver the greatest energy savings.

**Specialized Expertise**

Advanced Energy Innovations consultants and engineers are trained to conduct holistic audits that evaluate every system that potentially consumes or loses energy.

Through our proprietary E3 audit, we identify how clients can save energy, expense, and the environment. And recommend rebate and incentive programs to offset costs.

With a national network of partners, Advanced Energy Innovations brings in HVAC, window film, and other specialists to create for clients the most comprehensive energy efficiency solutions.



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