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UVC Lights Keep Hospital Cool, Efficient

Rio Grande Regional Hospital Projects Annual Energy Savings of \$500,000

The rapidly rising cost of air conditioning energy is a problem for hospitals everywhere, and McAllen, Texas, is no exception.

In a town where over 90°F days are common year round, and the mercury can top the 100° mark even in winter, the seasons might be described as “hot and hotter.” But at McAllen’s Rio Grande Regional Hospital, administrators are staying cool with the knowledge that — even in the face of a 33 percent utility rate hike — their electric bill has declined over the past two years.

What accounts for this phenomenon? You might be surprised. “We attribute it to the incorporation of UVC lights into the air handling systems,” answered Oscar Molano, director of plant operations for the hospital. “We were looking for a way to save on a/c energy costs without compromising air quality or patient comfort.”

They found the light (UVC), so to speak.

THE WONDERS OF UVC

Working with a local filter supply Company in Harlingen, Texas, Molano first learned that ultraviolet-C band (UVC) devices have become a popular addition to new and existing HVAC systems because of their multiple performance benefits. The energy emitted by the UVC devices is considered the most germicidal in the ultraviolet spectrum.

Properly installed in air handlers, UVC lights are designed to penetrate even the tiniest microbes to destroy their DNA and RNA, killing or deactivating them. In this manner, the lights effectively degrade mold and other organisms that sometimes grow deep inside HVAC systems, as well as airborne microbes that circulate through these systems to the occupied space. Decades-old studies have shown that even a microscopic layer of organic buildup on a/c coil fins can create a noticeable drop in system efficiency. By eliminating this buildup and preventing its recurrence, UVC devices are designed to keep coils continuously clean. This, in turn, lowers HVAC energy costs by improving heat transfer and increasing net cooling capacity.

CUTTING BACK THE CHILLERS

At Rio Grande Regional, 17 air-handling units (AHUs) are nine years old and range from 20 tons to 80 tons. Nine AHUs are four years old and are 70 tons to 80 tons. After reviewing the potential benefits, Molano approached the hospital's CEO and received approval to retrofit the 26 AHUs with UVC on a phased basis.

"We started early in 2005 and converted one or two AHUs every month thereafter," said Molano. The devices used at the hospital are designed for installation in large commercial HVAC systems.

"As our UVC retrofit program has progressed, we have seen a continuing and dramatic improvement in energy performance," said Molano.

Here is what Molano and the hospital discovered:

- Before any UVC devices were installed, the four 465-ton chillers serving the hospital were running at 99 percent capacity. According to Molano, chilled water "in" measured at 43°, while chilled water "out" measured at 64°.
- About 18 months later, after most of the AHUs had been equipped with UVC, the same chillers were running at only 62 percent capacity. According to Molano, chilled water "in" remained at 43°, but chilled water "out" temperature had decreased to 53°, an 11 degree drop.
- During that period, electrical usage (in kilowatt hours) declined 20.64 percent, said Molano. This essentially canceled out an equivalent rise in utility rates from \$.06 per kWh to \$.08 per kWh. As a result, with the addition of UVC throughout the hospital in 2005 and 2006, the electrical energy costs from 2005 to 2006 remained at a constant average of \$166,900 per month.

By fall of last year, as Rio Grande was wrapping up the conversion to UVC, hospital authorities determined the hospital was now too cold, even with the chillers running at reduced capacity. In late October, the hospital shut down two chillers completely, along with the accompanying chilled-water pumps, condenser water pumps, and cooling towers.

According to Molano, the two operating chillers are now running at 80 percent capacity, with chilled water "in" at 43° and chilled water "out" temperature at 60°. Kilowatt hours continue to decline, he said, pointing out that from January through May of this year, energy expense was down \$240,885 compared to the same time period in 2006. Based on this trend, annual energy savings are projected to be in the \$500,000-plus range.

"Needless to say, the recent cutback to two chillers will bring even more significant reductions in our energy cost," said Molano. "UVC technology has made a remarkable difference here. We used to need four chillers even when the temperature outside was 70°, and now two chillers do the job at 90°."

IAQ MAINTENANCE BENEFITS

UVC energy is designed to destroy airborne microbes, including all types of viruses and bacteria. It can help to maintain cleaner indoor air and reduce the risk of cross-infection in health care facilities. Though Rio Grande has not yet studied this aspect of UVC performance, some hospitals have reported reductions in nosocomial infection rates since adopting the technology.

UVC also is designed to help control indoor humidity and comfort levels. It can accomplish this end by keeping air conditioning components running cleanly and efficiently and improving airflow through the coils. At Rio Grande, all 26 AHUs are now running in “as new” condition, said Molano. “Our nursing staff, patients, and others seem very happy with the air quality in the facility,” he added.

In his estimation, HVAC maintenance has also been enhanced. Though the hospital still does occasional pressure washing of a/c coils with water, they have eliminated the use of acid for cleaning. In addition, drain pans stay clean and free of organic debris, so no further cleaning of these components has been needed, said Molano.

“Of course, we are pleased about the enhancement to our already good IAQ, and with the ability to reduce or eliminate certain maintenance tasks,” said Molano. “But right now, the energy savings we are achieving with UVC are first and foremost. This technology has tremendous potential for all types of buildings and homes.”

It should be noted here that the 320-bed hospital has received the Distinguished Hospital Award for Clinical Excellence for five years in a row (2003 – 2007) from HealthGradesT, considered one of the nation’s leading sources for health care quality information. This places the hospital among the top 5 percent of all hospitals in the nation. ■

Rio Grande Regional Hospital – McAllen, Texas Utility Savings with UVC:

Month	2006 Utility Cost: (Before UVC)	2007 Utility Cost: (After UVC)	Savings:
January -	\$158,790.	\$113,294.	\$45,496. (28.7%)
February-	235,547.	136,019.	99,528. (42.3%)
March -	120,616.	98,866.	21,750. (18.2%)
April -	156,919.	112,892.	44,027. (28.1%)
May -	144,383.	114,299.	30,084. (20.8%)
TOTAL:	\$816,255.	\$575,370.	\$240,885. (29.5%)