

MERCY MEDICAL CENTER

DES MOINES



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COMPANY BACKGROUND

As part of Catholic Health Initiatives, Mercy Medical Center is a not-for-profit hospital determined to emphasize the role of human dignity and social justice in the health care system. Its four values of reverence, integrity, compassion and excellence serve as cardinal principles in the creation of healthier communities throughout the Des Moines area. Founded in 1893, Mercy Medical Center has grown to be one of the largest employers in the state, with over 6,600 employees, 950 physicians and a facility featuring more than 802 beds.

PROJECT BACKGROUND

The goal of the project is to reduce overall energy consumption at Mercy Medical Center through establishing a baseline, identifying large energy consumers and creating reduction recommendations. All recommendations feature savings potential, installation costs and simple payback estimates. The intern's area of emphasis is the facility's HVAC system, with an investigation of free cooling as a priority.

INCENTIVES TO CHANGE

As part of its mission statement to emphasize social justice, Mercy Medical Center continually searches for ways to reduce its impact on the environment. One of the company's goals is to reach 100 days of free cooling, when any wintertime air conditioning can be provided by cold outside air. More pragmatically, the company has recently faced energy price increases from their utility supplier and seeks to lower energy costs by reducing wear and tear and maintenance of its equipment.

RESULTS

Free Cooling: Currently, chillers run during the winter to meet the cooling demand of interior spaces and special applications. Many air handling units (AHUs) feature air-side economizers but cannot be used during winter weather. When the current plant was originally set up, a plate and frame heat exchanger was fitted for the demand. Since then, the wintertime cooling load has increased. A larger unit could be installed economically, which would allow Mercy to utilize free cooling for a projected 140 days per year.

Lighting Choices: The type of lamp presently in use in the facility will soon no longer be offered by Mercy's lighting supplier. It was found that the replacement T8 lamp Mercy was considering will increase the lighting system's operating cost. After further analysis, a different T8 lamp was found that could decrease the cost of energy and upkeep relative to the current lamps, thus saving money on the overall system. Both T5 and LED lamps were considered but proved uneconomical at this time.

Demand Reduction: Mercy had installed an AHU turn-off schedule with the present control system but it was abandoned due to logistical issues. The intern recommended reconsidering the use of modified AHU scheduling and installing occupancy sensors to reduce demand.



AHU Upgrades: The approximately 60 Mercy AHUs vary greatly in age and corresponding technology. It is recommended that some of the older or less advanced units be updated with the most energy efficient technology available. This would include installing premium efficiency motors, cogged V-belts, variable frequency drives (VFDs) and low pressure drop filters in the machines that do not already have these technologies.

Steam System Upgrades: Considering only natural gas consumption, providing steam and hot water to the facility represents 27 percent of Mercy's utility bill. The natural gas is fed to three boilers, two of which are over 40 years old. Since their installation, economizer technology has progressed and is now more cost-effective, so the intern recommended steam system upgrades. Replacing the feedwater tank with a deaerator, allowing for warmer feedwater and decreased chemical costs, was also recommended.

Water System Upgrades: During the internship, water system upgrades were also considered. One opportunity would be to replace an open loop, city water cooled compressor servicing the morgue condenser with its air-cooled equivalent. Currently, the pumps circulating chilled water have VFDs installed but the pumps circulating condensed water do not; installing a VFD to one of these pumps is also recommended.



CONVENTIONAL AIR POLLUTANTS AND GREENHOUSE GASES DIVERTED IN STANDARD TONS

Total for all sectors					
CO ₂	SO ₂	CH ₄	N ₂ O	CFC	PM ₁₀
2205.10	9.89	260.02	42.92	22.97	0.25

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
FREE COOLING	\$41,647	948,679 KWH	RECOMMENDED
LIGHTING CHOICES	\$5,855	240,877 KWH	RECOMMENDED
DEMAND REDUCTION	\$109,903	1,690,131 KWH 72,441 THERMS	RECOMMENDED
AHU UPGRADES	\$30,386	692,164 KWH	RECOMMENDED
STEAM SYSTEM UPGRADES	\$41,782	84,767 THERMS	RECOMMENDED
WATER SYSTEM UPGRADES	\$26,421	240,877 KWH 3.0 MILLION GALLONS	RECOMMENDED

