THE NEBRASKA MEDICAL CENTER

VISHNU BONGUNURI
M.S. MECHANICAL ENGINEERING, BRADLEY UNIVERSITY, PEORIA, IL

OMAHA, NE

COMPANY BACKGROUND

The Nebraska Medical Center in Omaha, Nebraska, is the state's largest health care facility. The center is recognized as one of the top hospitals in the world for oncology, neurology, cardiology and both organ and bone marrow transplant. As the teaching hospital for the University of Nebraska, the center is known for excellence, innovation and quality patient care. The Nebraska Medical Center has been named the National Consumer Choice Award winner as a result of a large consumer study conducted by The National Research Corporation, and is ranked by 2012 U.S. News and World Report Best Hospitals in five specialties.

PROJECT BACKGROUND

Optimizing efficiencies of the hospital's mechanical systems provides both environmental and financial benefits by reducing utility costs associated with energy usage. The Nebraska Medical Center requested an intern to conduct a steam system assessment in Clarkson and Hixson-Lied buildings to identify efficiency opportunities. The intern also researched and provided recommendations for recovering heat from the air compressors, increasing efficiencies at the central utility plant and decreasing the lighting load by installing occupancy sensors.

INCENTIVES TO CHANGE

The hospital is participating in the U.S. Department of Energy's Energy Star Portfolio system, to integrate LEED design and construction practices into its new buildings and renovations. Since steam is the major utility consumed, it was determined that by increasing the efficiency of steam distribution and boiler efficiency, significant energy and cost savings would be generated. Additionally, projects utilizing waste heat recovery and decreasing the overall electric load would also not only save money but reduce the demand load as well.

RESULTS

The intern provided information on cash incentive opportunities that may be applicable to energy efficiency improvements currently in progress at The Nebraska Medical Center. The intern used the Database of State Incentives for Renewables and Efficiency (DSIRE), supported by the U.S. Department of Energy, as a reference.

Insulation on Steam Distribution Valves: Most of the steam distribution lines are insulated in Hixson-Lied and Clarkson Tower, but the gate valves and wye strainers at pressure reducing stations and heat exchangers are not insulated. Insulating these valves would reduce radiation losses and decrease the chiller load for cooling the space.

CONVENTIONAL AIR POLLUTANTS AND GREENHOUSE GASES DIVERTED IN STANDARD TONS

Total for all sectors					
CO_2	SO_2	CH_4	N_20	CFC	PM_{10}
501.78	0.58	300.79	0.75	2.47	0.04

Replace Failed Steam Traps: Approximately 19 steam traps in Hixson-Lied and Clarkson Tower building were failed in the open position, allowing for constant loss of steam. Replacing the failed traps could save more than 33,000 therms via recovered energy and reduce utility costs by $37,000 per year.

Heat Recovery from Air Compressors: Installing ductwork to recover the waste heat generated by three 50-hp air compressors used for medical vacuum supply would allow the hospital to recover that heat for other uses. Recovering heat from the air compressors could reduce steam used for space heating in the cooler months and reduce the chiller load in the summer months, while keeping the compressor room area cool. Roughly 55,400 therms per year of steam energy could be saved.

Install Occupancy Sensors: Lights are turned on and unknowingly left on for hours at a time in many of the lower traffic areas of the maintenance shop. By installing dual technology occupancy sensors in these areas, the hospital could save more than 25,000 kWh of energy annually.

Install Air Pre-heater/Economizers: Currently, four boilers in the central utility plant supply approximately 500 million pounds per year of steam to the campus. An air pre-heater or economizer in the boiler stacks could recover the waste heat and increase the efficiency of the boilers. An estimated 189,100 therms of energy per year could be saved.

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
INSULATION ON STEAM DISTRIBUTION VALVES	$11,680	10,580 THERMS	RECOMMENDED
REPLACE FAILED STEAM TRAPS	$37,084	33,350 THERMS	RECOMMENDED
HEAT RECOVERY FROM AIR COMPRESSORS	$ 63,931	55,400 THERMS	IMPLEMENTED
INSTALL OCCUPANCY SENSORS	$ 1,437	25,306 KWH	RECOMMENDED
AIR PRE-HEATER / ECONOMIZERS	$ 85,095	189,100 THERMS	RECOMMENDED