

# ENERGY SAVINGS FOR A HOSPITAL

## Background

The audit focused on the mechanical equipment of the facility serving three different areas of a hospital facility. The facility had an annual electrical energy consumption of over 4,800,000 kilowatt-hours (kWh) per year and an annual natural gas consumption of over 253,000 therms per year. The total energy costs were estimated to be approximately \$773,000 each year.

## Potential Energy Savings

The energy efficiency opportunities recommended could potentially save an estimated 362,311 kWh of electrical energy each year, or about 8% of the facility's total electrical energy usage. The recommendations could reduce the facility's electrical demand by about 57 kW. The recommendations could increase your natural gas consumption by 10,599 therms/yr, or 4.2% of the current usage. The potential total annual cost savings due to implementing all of the recommended measures was estimated to be approximately \$53,897 per year. Total estimated implementation cost was about \$73,819 giving an average simple payback of 1.4 years.

<b>SUMMARY OF ENERGY EFFICIENCY OPPORTUNITIES SAVINGS AND COSTS</b>						
Description	Potential Energy Conserved	Demand Savings (kW)	Potential Savings (\$/yr)	Implem. Cost (\$)	Simple Payback (years)	
1 Turn off the Dish Warmer When Not in Use	9,547 kWh/yr	0.00	1,286	0	Immediate	
2 Switch the Chilled Water Pump ASDs to Automatic Control	80,106 kWh/yr	0.00	10,790	200	Immediate	
3 Turn Off the Air Supply Fans When Their Service Areas are Unoccupied	60,404 kWh/yr	0.00	8,136	756	0.1	
4 Turn Off the Exhaust Fans When Their Service Areas are Unoccupied	27,053 kWh/yr	0.00	257	756	0.2	
5 Install Higher Efficiency Motors <sup>1</sup>	19,717 kWh/yr	1.62	2,656	858	0.3	
6 Install Bi-Level Lighting Control on the HID Lamps in the Boiler Room	2,674 kWh/yr	0.31	360	1000	2.8	
7 Replace Standard V-Belts with Cog-Type Belts	19,402 kWh/yr	2.69	2,613	1,943	0.7	
8 Retrofit the Incandescent Exit Signs with LED Lamps	19,569 kWh/yr	2.24	2,732	2,240	0.8	
9 Install High Efficiency Fluorescent Lighting in the Staircases	15,411 kWh/yr	1.76	2,074	3,383	1.6	
10 Install a Cooling Tower to Cool the Refrigeration Condensers	-6,110 kWh/yr	-0.70	8,473*	5,325	0.6	
11 Install High Efficiency Fluorescent Lighting in the Medical Office Building	20,692 kWh/yr	4.60	2,787	5,724	2.1	
12 Use Chilled Water to Cool the Telecom Room Instead of a Heat Pump	-2,043 kWh/yr	0.32	3,857*	11,866	3.1	
13 Replace the Existing Heat Pumps with Fan Coils	106,402 kWh/yr -10,599 therms/yr	45.47	9,292	41,603 <sup>+</sup>	4.5	
<b>Totals</b>	(Electricity)	<b>362,311 kWh/yr</b>	<b>57 kW</b>	<b>\$53,897/yr</b>	<b>\$73,819</b>	<b>1.4 years</b>
	(Natural Gas)	<b>-10,599 therms/yr</b>				

<sup>1</sup> Based on two-year figures.

\* Includes water and sewer savings.

<sup>+</sup> Based on a differential cost.

## **Implemented Measures**

In following up with the plant half a year after submitting the report, the plant had already implemented or was in the planning stages of implementing all of the recommended energy efficiency measures. Some of the implemented measures are included as follows.

### *Measure 2 – Switch the Chilled Water Pump ASDs to Automatic Control*

The plant has a dual-loop chilled water system. The secondary loop pumps have adjustable speed drive (ASD) controls, but the controllers have been set on manual control. According to facility personnel, the ASDs are set at 100% flow in the summer and are set at between 50% to 70% flow in the winter. It was recommended that the plant switch the ASDs on the secondary chilled water pump motors from manual control to automatic. Allowing the ASDs to automatically react to changing return water temperature will reduce the power consumption of the secondary chilled water pumps by over 80,000 kWh per year.

### *Measure 3 – Turn Off the Air Supply Fans When Their Service Areas are Unoccupied*

Conditioned air from the facilities' air handlers is supplied to the various hospital departments by several supply fans that operate continuously. It was recommended that timers be installed on two of the air supply fans to turn-off the fans when the areas they supply air to are unoccupied to save electricity. Turning off the two fans during times when they are not needed would result in energy savings of over 60,000 kWh per year.

### *Measure 8 – Retrofit the Incandescent Exit Signs with LED Lamps*

Most of the areas in the hospital use conventional exit signs containing incandescent bulbs. Exit signs containing incandescent bulbs can be replaced with exit signs containing LED bulbs, which use about 1/8 of the energy. An estimated electrical energy savings of 19,500 kWh per year can be realized due to the lower power consumption of high efficiency LED exit signs.

### *Measure 13 – Replace the Existing Heat Pumps with Fan Coils*

The facility has six heat pump units located on the roof of the main hospital building to provide conditioned air to various areas. The existing heat pumps are old and do not operate as efficient in providing conditioned air to their service areas as a fan coil system could. Considerable electrical usage and cost savings would be realized by switching from the heat pumps to a fan coil system. It was estimated that replacing the existing heat pumps with fan coils would result in an electrical energy savings of 106,000 kWh per year and reduce the demand by approximately 45 kW, but would increase the natural gas consumption by approximately 10,600 therms per year. The total cost savings amounted to approximately \$9,300 per year.