ENERGY SAVINGS FOR A BREAD PLANT

Background

This plant produces a variety of fresh buns and breads. The facility had an annual electrical energy consumption of almost 3,600,000 kilowatt-hours (kWh) per year and an annual natural gas consumption of over 551,000 therms per year. The total energy costs were estimated to be approximately $820,000 each year.

Potential Energy Savings

The energy efficiency opportunities recommended could potentially save an estimated 339,665 kWh of electrical energy each year, or about 9% of the plant's total electrical energy usage. The recommendations could reduce the facility's electrical demand by about 464 kW. The recommendation could save an estimated 17,486 therms of natural gas each year, or 3% of the plant's total natural gas energy usage. The potential total annual cost savings due to implementing all of the recommended measures was estimated to be approximately $54,200 per year, which represents about 7% of the plant's total energy costs. Total estimated implementation cost was about $55,700 giving an average simple payback of 1.0 year.

SUMMARY OF ENERGY EFFICIENCY OPPORTUNITIES SAVINGS AND COSTS

Description		Potential Energy Conserved	Demand Savings (kW)	Potential Savings ($/yr)	Implem. Cost ($)	Simple Payback (years)
1 Control the Variable Frequency Drive on the Thermal Oxidizer Blower		72,134 kWh/yr	0.00	7,770	633	0.1
2 Replace Standard V-Belts with Cog-Type Belts		8,994 kWh/yr	1.22	1,169	1,485	1.3
3 Install Higher Efficiency Motors*		35,071 kWh/yr	3.22	4,561	2,272	0.5
4 Reduce Air Compressor Discharge Pressure		23,633 kWh/yr	3.22	3,069	2,580	0.8
5 Install Occupancy Sensors Throughout the Facility		25,521 kWh/yr	4.03	3,406	2,844	0.8
6 Use Blowers in Place of Compressed Air on Bun Line		115,688 kWh/yr	21.60	15,977	9,046	0.6
7 Install Variable Frequency Drive on the Chilled Glycol Pumps		58,624 kWh/yr	6.84	7,427	12,794	1.7
8 Preheat the Boiler Feedwater with Heat from the Bread Oven Exhaust		17,486 therms/yr	N/A	10,829	24,035	2.2
Totals	**(Electricity)**	**339,665 kWh/yr**	**40.1 kW**	**$54,208/yr**	**$55,689**	**1.0 years**
	(Natural Gas)	**17,486 therms/yr**				

* Two year figures.

Implemented Measures

In following up with the plant half a year after submitting the report, the plant had already implemented or was in the process of implementing several of the recommended energy efficiency measures. Several of the other measures are being evaluated by the plant and possibly planned for implementation in the near future. Some of the recommended measures are included as follows:

Measure 1 – Control the Variable Frequency Drive on the Thermal Oxidizer Blower
The facility uses a thermal oxidizer to burn the oven exhausts from the production lines. The 60 hp oxidizer blower, although equipped with a variable frequency drive (VFD) was not controlled. By controlling the oxidizer blower VFD based on the pressure buildup at the inlet of the oxidizer blower, an electrical energy savings of over 72,000 kWh can be obtained due to the fact that the blower will run at a slower speed when one or both ovens are not operating. This measure was implemented shortly after our recommendation

Measure 6 – Use Blowers in Place of Compressed Air on Bun Line
The bun line utilizes high-pressure compressed air jets and air bars to clean the bun pans before loading the dough into them and after the baking, once the bun is removed from the pan. High-pressure blowers can be used to produce the air used to clean the bun pans and prevent the dough from sticking to the machinery in the bun line. Replacing the use of compressed air with high pressure blowers will result in an estimated electrical energy savings of over 115,000 kWh per year, with a demand reduction of 21 kW. Shortly after our recommendation, the plant is in the process of implementing the measure.

Measure 8 – Preheat the Boiler Feedwater with Heat from the Bread Oven Exhaust
The plant has two baking ovens for making bread and buns. The exhaust temperature of the bread oven was measured to about 650 °F. It was recommended for a heat exchanger to be installed in the common exhaust stack of bread oven in order to preheat boiler feedwater. The heat recovered from the bread oven exhaust will result in a natural gas energy savings of about 17,500 therms per year for the steam boilers. The plant is looking into implementing this measure as funding becomes available.