Success Story

Commercial Bakery

Energy Efficiency in Food Processing

Center for Energy Efficiency & Renewable Energy at UMassAmherst

In the summer of 2013, a team from the UMass Amherst Industrial Assessment Center (IAC) did an assessment to consider energy, waste and process-related improvements for a commercial bakery in New England. This 22,000 square foot facility with 90 employees produces bread products seven days a week. Annual costs for electricity and propane use in the facility totaled $444,000. As a result of this assessment, the bakery has reduced its annual operating costs by approximately $83,500.

The IAC program, sponsored by the U.S. Department of Energy, provides free energy and resource use assessments of small to mid-sized industrial facilities. The New England region is served by the IAC at the University of Massachusetts Amherst, based in the Mechanical and Industrial Engineering Department's Center for Energy Efficiency and Renewable Energy. Engineering graduate students conduct the assessments under the leadership of Professor Beka Kosanovic.

After reviewing the facility's utility bills, the IAC team made a one-day site visit to the bakery to meet with facility staff, learn about the production process and site operations, review all major energy-consuming equipment, and measure performance of key equipment, such as air compressors, using the Center's metering and diagnostic tools.

Several weeks later, the IAC provided a report with nine recommendations to reduce operating costs and improve the facility's energy efficiency. Each recommendation was explained in detail, including estimates for resource and cost savings, implementation costs, and emissions reductions.

Soon after the assessment, the company implemented all nine of the IAC recommendations, including improvements to the facility's compressed air system, upgrades to space heating equipment and lighting, and heat recovery from oven exhaust.

The equipment and labor costs for implementation totaled $159,300, and the local energy efficiency program provided incentives to offset these costs. The annual cost savings paid for this investment in less than two years.

Recommendations implemented:

- Install a heat exchanger to use combustion exhaust to preheat air entering an oven
- Eliminate unnecessary uses of energy-intensive compressed air:
  - Install high pressure blowers for packaging, rather than using compressed air
  - Install electric vacuum pumps in place of the current pumps that use compressed air
- Improve the compressed air system by installing another storage tank and increasing the piping diameter, which will allow for reducing the compressor pressure setpoint
- Insulate steam pipes
- Upgrade to air handling units that will recirculate an appropriate amount of heated air rather than bringing in 100% outside air
- Upgrade overhead lighting
- Install occupancy sensors in storage area to automatically turn lights on and off as needed
- Purchase an ice machine to produce ice on site rather than purchasing and transporting ice

Annual benefits:

- Electricity savings: 59 MWh
- Propane savings: 16,500 gallons
- Emissions reductions: 119 tons CO_2, 316 pounds NOx

Annual cost savings:

- $83,500 total
  - $61,600, or 14% reduction, in energy costs
  - $21,900 additional savings

Implementation cost:

- $159,300

Simple payback period (before utility incentives):

- 1.9 years

To learn more about the Industrial Assessment Center and find out if your facility is eligible for a free assessment, visit www.ceere.org/iac or contact IAC Director Beka Kosanovic at 413-545-0684 or kosanovic@umass.edu