Business Case Study:

Ernest and Julio Gallo Winery

Background

- Type of Business: Winery
- Location: Modesto, CA
- Size: 4,600 employees total, four wineries statewide
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Summary

Ernest and Julio Gallo Winery (E&J Gallo) is the largest winery in the world and owns vineyards and facilities throughout California, most notable are those in the Sonoma area. In light of the uncertainty of energy supplies and increasing costs in 2001, E&J Gallo Winery, in cooperation with Modesto Irrigation District (MID), identified an innovative cooling program. Staff used the finished wine product as thermal storage allowing the winery to shift significant energy loads to off-peak hours and reduce overall energy demand. Future projects will see installation of similar equipment and controls in the remaining finished product and brandy warehouses. Shifting the cooling hours reduced energy costs (off-peak rates are less than on-peak rates) and helped stabilize future rate hikes.

Referenced in Business Guides:

- #2, "Reduce Energy Use in Industrial and Manufacturing Facilities Through Conservation and Efficiency Measures"

Plan

The facilities managers planned to transfer cooling load to off-peak hours and upgrade the cooling equipment in the warehouses. To implement the innovative cooling program facility managers first had to prove:

1. The wine temperature remained fairly constant and equal to the average temperature of the warehouse.

2. Warehouse temperatures are greatly influenced by the temperature and volume of product that is stored within it.

Winemakers had always assumed that wine temperature rose and fell parallel and equal to the interior temperature of the warehouse and thus cooling was required throughout the day to keep wine temperatures constant. The team estimated the peak-cooling load in the three finished product warehouses required approximately 1,000 tons of refrigeration and the daily average cooling load required 500 tons. Given the approximately 15 million gallons of liquid product stored in the warehouses and the cooling loads, the team expected an average increase in product temperature of approximately 0.1 degrees F per hour at peak time of the day.

The facility managers conducted several experiments to test their theory using temperature probes in the warehouse and in bottles of finished product and noticed that there was little (less than 0.1 degrees) noticeable product temperature differential when the cooling system was turned off during the day. Warehouse temperatures were steady around +/- 2 degrees F, despite outside air temperatures of over 100 degrees F. The team did see a significant air temperature gradient above the stored product near the roof. The roof is approximately 10 feet above the stored product. The staff also found that temperatures remained fairly constant for 24 to 72 hours when the cooling system was off.

At the same time the team was testing the effectiveness of the new cooling program, they were also researching improvements that could be made with the cooling equipment in the three finished product warehouses. The warehouses were cooled with 38, 15-ton package air-conditioning units and 13 air-handling units that received chilled water from a 500-ton absorption chiller driven by a low-pressure boiler. Gas prices were expected to double and thus the low-pressure boiler was becoming highly uneconomical to run.

Programs: Conservation

✓ **Controls**: Installed a new central computerized Train Tracer Summit control system in three warehouses to provide E&J with the ability to schedule equipment operating hours. The new system reduced electricity usage and eliminated the need for gas.

✓ **Equipment schedules**: Facilities managers shut down the cooling system during MID peak hours, turning off the system everyday between 11 a.m. and 9 p.m. The cooling systems were turned on during the night when outside air temperatures was in the low 60s. Expected energy reduction of 20-30 percent, or 300-500 kW. Expected energy cost savings of 40-50 percent. The winery plans to extend these schedules and changes to its other wine and brandy storage facilities.

Programs: Efficiency

✓ **HVAC**: Replaced 38 old 15-ton package air-conditioning units with two new high-efficiency centrifugal chillers, an expanded central chilled water system and 8 new air-handing units. The new equipment reduced energy use and the need for gas. The 38 package units were very old, inefficient and in a state of disrepair.

Budget and Finance

The funding came from the Gallo Capital budget and the team managed allocation of the funds.

E&J Gallo received a $250,000 rebate from MID Power for some construction costs. MID has a limit on the amount of power they can produce. From 3-6 p.m., power needed can exceed MID's production capacity, thus they have to purchase the additional energy required from other sources. This power is usually purchased at a loss. MID worked with large users to see how they could cut back energy use from 3-6 p.m. so that they would not have to raise rates.

Results

With the new high-efficiency 1,000-ton chilled water plant, E&J Gallo saw a 23 percent reduction in energy usage. The new cooling schedules also saved money – off-peak rates are lower than on-peak rates.

Winner: Flex Your Power Energy Conservation Award (2002)

Lessons learned

E&J Gallo Winery found that in order for the wine to stay cool during the day, the warehouses had to be kept reasonably full and the required temperatures could not vary too far from the average outside air temperature. E&J Gallo had to discredit common assumptions and prove that the wine temperature did not rise and fall with the warehouse temperature and that the air-cooling mode could be turned off during the day.