



Odwalla Juice: Industrial Energy Assessment Finds Valuable Large Savings for Citrus Juice Maker Company

ASSESSMENT DATE: JUNE 13, 2002

BENEFITS:

- Implemented 6 recommendations while minimizing energy consumption and optimizing efficiency
- Recommendations will reduce total energy usage by 15.0% per year
- Can achieve paybacks ranging from 0.5 to 3 years with an overall payback period of 0.6 years.

APPLICATIONS:

"We at Odwalla would like to thank you for the audit that was done at our facility. Not only were you and your staff very professional but generated cost saving proposals that we were able to institute. We would be glad to give high marks in any recommendation that would be needed."

Gary Rosenberger
Odwalla Juice

Summary

The assistance of the San Francisco's State University Industrial Assessment Center was solicited to perform an energy audit of the Odwalla Juice Corporation's Dinuva in California. Opportunities for saving electricity were identified through the installation of several devices to control both motor usage and compressed air system usage. The Assessment team was able to develop savings on the production side by upgrading industrial machinery. The assessment team concluded that the installation of high efficiency motors, and installing boiler economizers would reduce energy consumption by more than 9,000 MMBtus and reduce energy costs by \$430K yearly. Further results from this assessment are specified throughout the case study.

Company Background

Odwalla Juice is a citrus juice manufacturer. The process entails sanitizing raw materials, pressing, juice extraction, mixing and packaging their product. The company has been very successful with its global system. The various methods used by the facility for its production absorb a significant amount of energy. Indeed, the total energy budget for the plant is above one million dollar per year, the bulk of which is electricity usage with the remainder being natural gas consumption.

Assessment Approach

A team of faculty, staff and students from the San Francisco's State University at the Industrial Assessment Center performed an Industrial Assessment in the summer of 2002. The assessment was led by Dr. Ahmad Ganji, Center Director, and Shy-Shenq Liou, Assistant Director.

Energy Conservation Awareness

The assessment team identified energy conservation awareness practices for the employees at the Odwalla Juice facility as a cost-effective way to significantly reduce energy consumption. Employees are encouraged to turn off or shut down idle processing equipment, lights, fans, air compressors, and other types of energy-consuming components that are not being used.

At the facility, heating comprises 38% of total natural gas usage while the remainder is used in process. Motors comprise 25% of total electricity usage while the remaining consists of compressed air (6%), lighting (8%), and HVAC together with miscellaneous systems (23%). By identifying the major energy consuming equipment, the IAC was fully prepared to recommend projects with the highest returns.



Refrigeration System Optimization

The assessment team observed that the facility uses both 20 and 50 horsepower glycol pump motors for cooling the pasteurization lines. The energy savings were generated by installing adjustable speed drive (ASD) controllers to both pump motors. ASD's benefit the electrical demand and consumption costs by as much as \$31,500 annually.

The IAC team also recognized the plant uses an ammonia refrigeration system in juice processing and storage. In fact, this method was one of the major energy absorbers due to the demand size having 7 ammonia compressors running for its operations. Due to this part the team calculated estimated savings by lowering the head pressure to its "float" pressure without affecting the refrigeration system's demand. The company put into operation the mentioned method and saving not only energy by 1 Million kWh/yr but also \$ 107,810 annually.

Motors

In addition to enhancing the method used for the ammonia refrigeration system, the team suggested the replacement of aged electrical motors to high efficiency motors. The team projected and predicted a yearly savings of \$ 6,000. (Motors are replaced as aged motors wear out)

Productivity

Increasing productivity was achieved by automating the packaging on the bottle line, thus leading to a reduction in labor expenditures. A setup suitable for packaging bottles was put into practice leading considerable savings of \$101K per year.

Results

Table 1 shows the annual cost savings that the Odwalla's Juice facility achieved by implementing the energy conservation opportunities identified in the assessment report identified by the IAC team. Based on these results, the facility reduced energy usage by over 9,000 MMBtu each year with total savings of \$260K yielding an overall simple payback of 1.6 years.

Projects Identified

Opportunities for reducing energy and gas consumption that were identified during the assessment are described in the following table:

Table 1. Opportunities at Odwalla Juice's Forest Facility				
Recommended Action	Annual Resource Savings	Annual Cost Savings (\$)	Implementation Cost (\$)	Payback (months)
<i>Motors</i>				
Convert Ammonia Refrigeration to Floating Head Pressure	3,466 MMBtu	\$107,810	\$50,000	6
Install HE motor	1,000 MMBtu	\$6,304	\$4,110	8
<i>Pumping Systems</i>				
Install Variable Speed Drive on Both Glycol Pumps	936 MMBtu	\$31,494	\$16,627	6
<i>HVAC Systems</i>				
Install an economizer on the boiler	4,155 MMBtu	\$21,274	\$17,580	10
<i>Productivity</i>				
Automate packaging of the 1.89 liter bottling line	N/A	\$101,519	\$350,000	41
Totals	9,557 MMBTU/yr	\$268,401	\$438,317	20

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