



Business Case Study:

Grundfos Pumps Mfg. Corp.

Background

- Type of Business: Producer of stainless steel pumps
- Location: Fresno County, Calif.
- Size: 275 to 300 employees; 230,000 square feet
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Summary

In 1999, Grundfos as part of its ISO14001 Environmental Management System committed to reduce overall energy consumption by 3.3 percent annually, for a three-year period with a total reduction of 10 percent at the end of 2002. In 2001 alone, Grundfos cut energy use by 28 percent in its 230,000 square feet of factory and office space. Grundfos employees were instrumental in helping the company exceed expectations in energy conservation.

Referenced in Business Guides:

- #2, "Reduce Energy Use in Industrial and Manufacturing Facilities Through Conservation and Efficiency Measures"
- #3, "Target Business Employees for Energy Conservation in the Workplace"

Plan

Grundfos worked with one of its industrial suppliers to audit the lighting in the Fresno facility and provide retrofit/energy conservation options for approval and implementation. Grundfos purchased two sample T5 lighting fixtures to install for evaluation prior to implementing a facility-wide replacement.

The company's goals were to avoid a \$300,000 potential increase in energy bills and avoid passing on costs to customers. Grundfos asked its employees to submit energy conservation ideas.

In 2001, two Voluntary Process Improvement (VPI) Teams named "Reduce the Juice" were formed to research and track energy consumption, identify opportunities for improvement, present ideas to senior management and

implement corrective actions. VPI teams are employee-driven, cross-functional teams and involve production staff, an industrial engineer, managers, maintenance staff and supervisors. To research the most cost-effective energy conservation ideas, the Reduce the Juice teams followed the seven steps of the "Process Improvement Roadmap."

Initial energy conservation projects included a facility-wide replacement of lighting, installation of occupancy sensors throughout offices and initiation of an air leak program to identify and fix air leaks throughout the factories to reduce the air compressor usage and run times.

Programs: Conservation

✓ **HVAC:** Scheduled and set HVAC system with computerized Novar system. Grundfos programmed schedules of operation for individual HVAC systems as well as settings, such as temperatures for each room. Factory air conditioners was adjusted up 3 degrees F to 78 degrees F.

✓ **Lighting:**

- Controlled lighting independently with computerized energy management system. Turned on some lights for eight hours instead of 24.
- Reduced outdoor lighting by 50 percent in June 2001 by turning off unnecessary lighting.
- Turned off lights during lunches, breaks, after hours and on weekends.

✓ **Air compressors:** Increased the cycle time of each of its four air compressors from 35 seconds between load cycles to 135 seconds between load cycles.

✓ **Schedules:**

- Shifted hours of production to reduce summertime peak usage. Manufacturing shift changed to 4:30 a.m. to 1 p.m.
- Changed hours of operation of offices in the summertime to 6 a.m. to 2:30 p.m. At 2:30 p.m. daily, power was shut down on the second floor and everyone working on that floor had to relocate to the first floor.

Programs: Efficiency

✓ **Lighting:**

- Replaced fluorescent area task lighting with T8s and electronic ballasts in factories in 2000.
- Replaced 284 metal-halide, high-bay light fixtures (460 watts per fixture) with 204 T5s (235 watts per fixture) factory-wide.

✓ **Air compressor maintenance:** Repaired 250 air leaks on air compressor units. Searched for air leaks in facilities during idle time; identified leaks by sound. Proactively sprayed soapy water on any questionable locations to verify that a leak existed. Created an air leak log sheet. By repairing the leaks, Grundfos could run one air compressor instead of two. Checking for air leaks became a regular part of the maintenance program.

Programs: Employee Outreach

✓ **Team work:** Under the Volunteer Process Improvement program, each employee team picks a leader, an enforcer and a note taker; sets a scope and vision; and develops a cost package with payback period. Each team selects a name and receives T-shirts printed with the team name. Projects costing more than \$2,000 to \$3,000 had to be approved by management. This program put responsibility and ownership on employees. Upon completion of a project, the company hosts a lunch or dinner for the team.

✓ **Incentives:** Encouraged employees to suggest energy improvement projects and request up to \$500 to implement the project under the company's "Speed up the wheel program." Suggested improvements required management approval.

✓ **Communications:** Spread the conservation message at company meetings and made presentations in the break rooms and workstations. Mandatory employee meetings on all company issues were held quarterly. Updates of energy conservation and efficiency projects were provided in company newsletters and on a VPI bulletin board.

Budget and Finance

There was no set budget for changes. In 2001, the "Reduce the Juice" teams came up with suggestions for the facilities, which were approved by senior management. The ideas developed by the "Reduce the Juice" teams had to be cost effective with a detailed description on the return of investment. Most projects were no or low cost. The following are the approximate costs of each 2001 program:

- Repaired leaks in air compressors: Low cost
- Increased compressor cycle time: No cost
- Shifted hours of operation: No cost
- High bay lighting, T8 retrofit, sensors: \$117,000; \$50,000 Pacific Gas & Electric rebate

- Reduced lighting during breaks, off-hours: Less than \$100
- Program EMS to control lighting: No cost

Results

Grundfos reduced its energy consumption by 28 percent (1.8 million kWh) in 2001, well exceeding its goal of 3.3 percent. On-peak usage decreased by 52 percent and demand by 22 percent. Grundfos saved more than \$250,000 in energy costs.

The estimated energy and cost savings for each program were as follows:

- Repaired leaks in air compressors: 94,000 kWh and \$14,000 @ \$0.15/kWh.
- Increased compressor cycle time: 10,000 kWh.¹
- Shifted hours of operation: 760,000 kWh and 20 percent reduction in costs for savings of \$10,000-\$12,000/month or \$60,000 over six months.
- High bay lighting, T8 retrofit, sensors: 864,000 kWh, 45 percent reduction over three years, and reduced energy costs \$175,000 over three years.
- Reduced lighting during breaks, off-hours: 5,000 kWh and \$750 in avoided energy costs.
- Program EMS to control lighting: 10,000 kWh and \$1,500 in avoided energy costs.

Grundfos's lighting replacement program also resulted in the following benefits: Eliminated 80 high-bay fixtures; freed up storage space; doubled light levels; and saved on use of three air-conditioning units because the T5s operate at a cooler temperature (95 degrees F vs. 760 degrees F).

The Reduce the Juice team won the Gold Medal For Excellence Award from the California Team Excellence, after submitting an 18-minute video about its conservation programs. The team represented the State of California in a national team competition and received an award as a finalist from the Association for Quality Participation. Won the Flex Your Power Energy Conservation Award in 2002.

Lessons Learned

Employee involvement was critical to company-wide success. Staff should be engaged in all stages of an energy conservation project so that they develop a sense of ownership of the project.

1. This figure does not take into consideration air density as a result of outside temperature. It is easier to compress air in cooler months when air density is higher.)