



# ALUMINUM

## Best Practices Management Case Study

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OFFICE OF INDUSTRIAL TECHNOLOGIES  
ENERGY EFFICIENCY AND RENEWABLE ENERGY, U.S. DEPARTMENT OF ENERGY

### BENEFITS

- Decreases energy costs
- Reduces process waste
- Increases sustainability
- Improves product quality
- Reduces equipment maintenance
- Increases capacity and throughput
- Reduces environmental impact
- Increases energy awareness within the workforce

### APPLICATIONS

NAE has established a goal to reduce its energy consumption by 15 percent by 2003. Meeting that goal would substantially reduce corporate energy consumption, improve profitability, and reduce the environmental impact of production.

## Corporate Energy Conservation Program for Alcoa North American Extrusions

### Summary

Alcoa North American Extrusions (NAE) views energy conservation as a means of eliminating waste and increasing sustainability. Energy-efficient production processes not only reduce the amount of money required to purchase energy, but also yield benefits such as improved product quality, reduced equipment maintenance, increased capacity, better throughput, and reduced environmental impact. The development of a corporate energy conservation program has also substantially increased energy awareness within Alcoa's workforce.

### Company Background

Alcoa, Inc., is the world's leading producer of primary aluminum, fabricated aluminum, and alumina. Alcoa is active in all major segments of the aluminum industry, including mining, refining, smelting, fabricating, and recycling. Alcoa provides the packaging, automotive, aerospace, construction, and other markets with a variety of fabricated and finished products. The company is composed of 24 Business Units, with 103,500 employees at 215 operating locations in 31 countries. NAE is the industry's leading supplier of extruded and cold-finished/cold-drawn aluminum products.

### CASTING OPERATIONS AT SPANISH FORK, UTAH



NAE is a Business Unit of Alcoa with 18 locations in the United States, and is divided into four manufacturing groups:

- Alcoa Extruded Aerospace Products, supplying aluminum-extruded shapes, rods, bars, and tubes to the aerospace and defense markets.
- Alcoa Engineered Products, producing extruded and cold-finished/cold-drawn aluminum products for the distribution, commercial transportation, automotive, industrial, and consumer markets.
- Alcoa Extruded Construction Products, supplying intricate and specialty architectural shapes to the residential and commercial window and door markets, bath and shower door markets, and various other markets.
- Alcoa Extruded Heat Exchanger Products, manufacturing extruded aluminum products for heat exchangers.

NAE has established a goal to reduce its energy consumption by 15 percent from its 1999 production baseline of 19 gigajoules per metric ton (GJ/MT). Meeting this goal would save 2.85 GJ/MT, resulting in an annual decrease of 2 million gigajoules of energy and 65,000 metric tons of CO<sub>2</sub> emissions. This would significantly improve company profitability and greatly reduce the environmental impact of production.

### Program Summary

The development of NAE's energy conservation program involved several steps.

- Targeted energy assessments were conducted at various facilities. These included an assessment at the facility in Lafayette, Indiana, conducted with assistance from the United States Department of Energy (DOE); a study of the steam system at Massena, New York, conducted by Pace Global Energy Services; and an internal Business Unit study of the Cressona, Pennsylvania, Ingot Department. Results of these assessments provided the basis for a comprehensive energy conservation white paper. The white paper serves as a resource and guide for all NAE facilities.

### ALCOA NORTH AMERICAN EXTRUSIONS FACILITIES

Alcoa Extruded Aerospace Products	Alcoa Engineered Products	Alcoa Extruded Construction Products	Alcoa Extruded Heat Exchanger Products
Halethorpe, MD Lafayette, IN Pimalco, AZ	Catawba, NC Cressona, PA Elizabethton, TN Massena, NY Morris, IL Spanish Fork, UT	Delhi, LA Fairburn, GA Hernando, MS Magnolia, AR Plant City, FL Tifton, GA Yankton, SD Warren, OH	Louisville, KY

## ENERGY-EFFICIENT MELTER



- Facilities at Spanish Fork, Utah, and Plant City, Florida, were selected for in-depth energy assessments. Assessment reports from these facilities were distributed to all NAE locations. Energy blitzes were conducted at facilities in Magnolia, Arkansas; Tifton, Georgia; Delhi, Louisiana; and Elizabethton, Tennessee.
- At least one individual with single-point accountability for energy was appointed for each facility. This individual is responsible for energy issues, using the corporate energy conservation white paper and plant energy assessment reports as resources for conducting assessments of other facilities.
- Innovative and improved technologies were evaluated for their potential impact on increased energy efficiency. Examples of these technologies include a vertical floatation melter, air/oxy-fuel burners, oscillating combustion, waste heat recovery, natural gas generators with waste heat recovery, dross processing equipment, combustion air preheating, taper billet heating, infrared die heating, electromagnetic induction stirring, indirect billet heating, and two-step aging. Pilot installations were implemented at several facilities.
- Monthly conference calls were conducted to discuss progress with energy conservation efforts.
- An energy alert program was implemented so that conservation ideas can be quickly shared with all facilities. These alerts are sent electronically to all NAE facilities and are also archived on the NAE web site.

## Results

Benefits from NAE's corporate energy conservation program have included increased employee awareness of energy issues, decreased energy consumption, improved product quality, decreased environmental impact from production processes, and increased conservation of natural resources. The energy conservation ideas that have been identified (and in most cases, implemented) are estimated to save NAE more than \$2.5 million annually.

The energy conservation white paper, individual plant assessments, energy alerts, and links to DOE resources have been posted on the NAE Web site. Nearly 100 energy alerts have been generated so far.

## Lessons Learned

Lessons learned from the development and implementation of NAE's energy conservation plan include:

- *Develop a partnership with DOE.* NAE and DOE have worked together on plant-wide energy assessments, training for maintenance and engineering personnel, the Industrial Assessment Program (involving local universities), specific assessments from DOE's BestPractices program, and development of new technology.
- *Identify energy champions.* Historically, there was no single point of contact for energy issues at NAE. A single-point accountability specialist for energy was appointed at each facility and also at the Business Unit level.
- *Provide an efficient means of communication.* Energy alerts and an energy efficiency and waste minimization newsletter are used for communication among facilities and upper-level management.



BestPractices is part of the Office of Industrial Technologies' (OIT's) Industries of the Future strategy, which helps the country's most energy-intensive industries improve their competitiveness. BestPractices brings together the best-available and emerging technologies and practices to help companies begin improving energy efficiency, environmental performance, and productivity right now.

BestPractices focuses on plant systems, where significant efficiency improvements and savings can be achieved. Industry gains easy access to near-term and long-term solutions for improving the performance of motor, steam, compressed air, and process heating systems. In addition, the Industrial Assessment Centers provide comprehensive industrial energy evaluations to small- and medium-size manufacturers.

## PROJECT PARTNERS

Alcoa North American Extrusions  
Lafayette, IN

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## Industry of the Future—Aluminum

Through OIT's Industries of the Future initiative, and on behalf of the aluminum industry, the Aluminum Association, Inc., has partnered with the U.S. Department of Energy (DOE) to spur technological innovations that will reduce energy consumption, pollution, and production costs. In March 1996, the industry outlined its vision for maintaining and building its competitive position in the world market in **Aluminum Industry: Industry/Government Partnerships for the Future**.

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