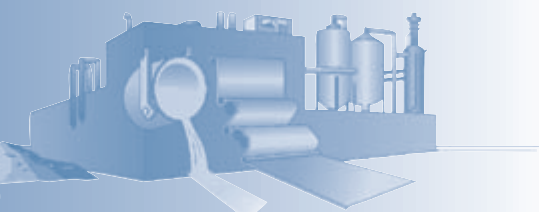


Energy Matters

INDUSTRIAL TECHNOLOGIES PROGRAM



Summer 2004

ISSUE FOCUS: Plant-Wide Assessments

IN THIS ISSUE

- Identifying Savings Opportunities through Plant-Wide Assessments 1
- What Can a Plant-Wide Assessment Do for You? 1
- Cost-Share Awards for Plant-Wide Assessments 2
- By the Numbers: Plant-Wide Assessments Generate Significant Cost Savings 3
- Industry Leaders Talk About Plant-Wide Assessment Benefits 5
- Alcoa Teams with DOE to Reduce Energy Consumption 5
- Coming Events 8

Identifying Savings Opportunities through Plant-Wide Assessments

Plant-wide energy assessments identify opportunities to improve overall operations and the efficiency of plant processes and utility systems. Only 40% of industry's primary energy requirements is delivered to manufacturing processes. Losses inside the plant are substantial and companies can realize significant energy efficiency gains from improvements in the operations of in-plant energy generation and distribution systems, process equipment, and other plant utility systems. Plant-wide assessments investigate energy use in energy-intensive industrial facilities—which can account for 10% or more of a plant's total operating cost—and highlight opportunities for best practices in energy management, including the adoption of new energy-efficient technologies and process and equipment improvements. To date, many companies have identified energy savings of between 10% and 15% from just one plant-wide assessment. Average payback period is usually less than 18 months.

Replication of the findings can also be very beneficial. Many of the energy-efficiency strategies and findings can be replicated in other plants that have similar process lines; such plants may be within the same company or in the same industrial sector. This strategy substantially increases the potential for energy savings, productivity improvements, emissions reductions, and other benefits.

Since 1999, a total of 43 plant-wide assessments have been awarded in six rounds of competitive solicitations. This issue of *Energy Matters* is devoted to highlighting some of the exciting results that plant-wide assessments have achieved for industry to date.

Find out which companies have been awarded plant-wide assessments over the course of six competitive solicitations, learn about the solicitation, and see how savings identified at one plant may be replicated at your facilities.

What Can a Plant-Wide Assessment Do for You?

Plant-wide energy assessments investigate overall energy use in industrial facilities—which can account for 10% or more of a plant's total operating cost—and identify cost-effective measures for best practices in energy management, including the adoption of new energy-efficient technologies and process and equipment improvements.

Plant-wide assessment teams characterize findings and document savings. Plants that participate in assessments and implement identified savings can expect a 10% to 15% improvement in energy costs and also improvements in productivity and waste reduction. Average payback period is usually less than 18 months. In addition, the findings from a single assessment may be replicated in other corporate facilities with similar process systems, utility systems, or equipment, and with comparable energy use.

Interested companies are invited to submit proposals in response to a competitive solicitation, usually offered by DOE once a year. Specifically, proposals are sought where industry-developed teams consider the adoption of best available and emerging technology using state-of-the-art tools, information, process engineering techniques, and best practices in energy management. Industrial plants that fall within the Industrial Technologies Program's initiatives are considered for an award. These include, but are not limited to, the agriculture, aluminum, chemicals, forest products, glass, metal casting, mining, petroleum, and steel industries. Funding of up to \$100,000 is available for each project selected, with matching funds or more required from industry. The solicitation is normally announced during the first quarter of the calendar year. Companies are strongly encouraged to develop and work closely with



Alcoa has identified more than \$60 million in savings opportunities, and has reduced its operating costs by more than \$15 million (page 6)



U.S. Department of Energy
Energy Efficiency and Renewable Energy

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

(continued on page 2) ►

Energy Matters

is published quarterly by the U.S. Department of Energy's (DOE) Industrial Technologies Program.

Information contained in the newsletter can be reproduced without permission provided due acknowledgement is given (the U.S. Department of Energy's Energy Matters newsletter) and a copy of the publication is supplied to the editor.



Editorial Board

Tom Bishop
Electrical Apparatus Service
Association

Rob Boteler, representing National Electrical Manufacturers
Association

Eric T. Fletty, Business
Development Manager, TAPPI

Gary L. Goehring, Alcoa
North American Extrusions

Glenn Hahn, Spirax Sarco

J. Bruce Medaris, Facilities
Consulting Services and
Executive Director, Compressed Air
Challenge®

Michael R. Muller, Center for Advanced
Energy Systems,
Rutgers University

Arvind Thekdi, E3M, Inc.

Chuck Whelan, DuPont



DOE Staff

Chris Cockrill, BestPractices, Motors

Bob Gemmer, Process Heating and
Steam

Grace Ordaz,
Technology Manager

Peter Salmon-Cox, Lead
Technology Manager, Technology
Delivery and BestPractices



Comments?

Contact:

David Wagman, Energy Matters Editor,
at 303-275-3602,

e-mail david_wagman@nrel.gov
or Karen Atkison, Associate
Editor at 303-275-3730, e-mail
karen_atkison@nrel.gov
1617 Cole Blvd., MS 1609
Golden, CO 80401

For new subscriptions, go to
[www.oit.doe.gov/
bestpractices/explore_library/
energy_matters.shtml](http://www.oit.doe.gov/bestpractices/explore_library/energy_matters.shtml)

For address/subscription changes, please
contact the editor.

What Can a Plant-Wide Assessment Do for You? (continued from page 1)

teams that could include their resource and equipment suppliers, engineering/consulting firms, academia, and other third-party entities who have expertise in plant assessments.

Plant-wide assessments may address a variety of generic and industry-specific technology areas, and a variety of plant/process optimization methods. Proposers should consider best practices in energy management and technology implementation, including the following areas: industry-specific process areas, plant steam delivery and process heating/cooling systems, electric motor systems (including motors, drives, pumps, fans, and blowers), compressed air systems, and heat exchange optimization. Other areas could include supply-side options using cogeneration, combined heat and power system technologies, and so on.

The results, successes, and experiences from these assessments are published in case studies. Confidentiality is protected and no proprietary company information is released. By publicizing assessment findings and results, DOE encourages other U.S. manufacturers to adopt and implement similar approaches to increasing energy and process efficiency and reducing environmental emissions. Participating plants will be made aware of and provided access to all DOE BestPractices tools and information resources that could assist the plants in implementing the most cost-effective solutions.

Cost-Share Awards for Plant-Wide Assessments

The following companies have received cost-share funding from DOE's Industrial Technologies Program through the competitive solicitation process to perform plant-wide energy-efficiency assessments.

Each company that is awarded a plant-wide assessment developed its own team, including energy assessor partners, to perform the assessments. ITP cosponsors this activity to achieve improvements in industrial energy efficiency, productivity, and global competitiveness. This list includes all awardees since 1999. Many of the companies' case studies can be accessed online at http://www.oit.doe.gov/bestpractices/pwa_awardees.shtml.

And remember, if other companies are able to identify cost-saving projects, maybe your company can too!

Plant-Wide Assessment Awardees

Company Name and Plant Location	Case Study Web Address
Aluminum	
Alcoa, Bauxite, AR	http://www.oit.doe.gov/bestpractices/factsheets/mi_cs_alcoa_world_alumina.pdf
Alcoa, Lafayette, IN	http://www.oit.doe.gov/bestpractices/factsheets/alcoa.pdf
Commonwealth Aluminum, Urichsville, OH	Not Yet Available
Pechiney Rolled Products, Ravenswood, WV	Not Yet Available
Chemicals	
3M, Hutchinson, MN	http://www.oit.doe.gov/bestpractices/factsheets/ch_cs_3m_pwa.pdf
Akzo Nobel, Morris, IL	http://www.oit.doe.gov/bestpractices/factsheets/ch_cs_akzo.pdf
Bayer, New Martinsville, WV	http://www.oit.doe.gov/bestpractices/factsheets/ch_cs_bayer_polymers.pdf
Formosa Plastics, Point Comfort, TX	Not Yet Available
Neville Chemical, Anaheim, CA	http://www.oit.doe.gov/bestpractices/factsheets/ch_cs_neville_chemical_company.pdf
Rohm and Haas, Knoxville, TN	http://www.oit.doe.gov/bestpractices/factsheets/ch_cs_rohmhaas.pdf
W.R. Grace, Baltimore, MD	http://www.oit.doe.gov/bestpractices/factsheets/ch_cs_wrgrace.pdf
Solutia, Springfield, MA	Not Yet Available

The summer issue of Energy Matters Extra provides access to more plant-wide assessment (PWA) information on the BestPractices Web site, including direct links to published case studies. These publications describe PWAs in industrial facilities and the energy- and cost-savings potential that the assessment teams found. Plus, find out what R&D projects in the chemical and forest products industries have been awarded funding by DOE. And, learn how an independent evaluation has confirmed the effectiveness of the Compressed Air Challenge® training program. These features and much more are available in the current issue of Energy Matters Extra. Get on the Internet and view it at www.oit.doe.gov/bestpractices/energymatters/emextra/.

By the Numbers: Plant-Wide Assessments Generate Significant Cost Savings

Since plant-wide assessments began in 1999, DOE has supported 43 projects through competitive solicitation. To date, industry and DOE together have invested \$9.4 million in the 43 assessments. A total of 35 assessments have already been completed, identifying total potential annual savings of \$186 million. Chart 1 on the following page shows the cumulative annual savings identified from plant-wide assessments since the first assessments were completed in federal fiscal year 2000 (which ended September 30, 2000). These opportunities have an average 18-month payback and have been completed across a range of industries, including forest products, metal casting, aluminum, steel, glass, petroleum, forging, heat treatment, and chemicals. The assessments have identified savings opportunities in many areas, including industry-specific process areas, steam systems, pumps, compressed air systems, process heating, process cooling, sensors and controls, fans, insulation, and motors and drives.

(continued on page 4) ►

Forest Products

Appleton Paper, West Carrollton, OH	http://www.oit.doe.gov/bestpractices/factsheets/newapple.pdf
Blue Heron Paper, Oregon City, OR	http://www.oit.doe.gov/bestpractices/factsheets/fp_cs_blue_heron.pdf
Boise Cascade, International Falls, MN	http://www.oit.doe.gov/bestpractices/factsheets/boise.pdf
Caraustar Industries, Rittman, OH	http://www.oit.doe.gov/bestpractices/factsheets/caraustar.pdf
Georgia-Pacific, Crossett, AR	http://www.oit.doe.gov/bestpractices/factsheets/fp_cs_georgia_pacific_crossett.pdf
Georgia-Pacific, Palatka, FL	http://www.oit.doe.gov/bestpractices/factsheets/fp_cs_georgia_pacific.pdf
Inland Paper, Rome, GA	http://www.oit.doe.gov/bestpractices/factsheets/inlandpaper.pdf
Weyerhaeuser, Longview, WA	http://www.oit.doe.gov/bestpractices/factsheets/fp_cs_eyerhaeuser.pdf
Weyerhaeuser, Plymouth, NC	Not Yet Available

Glass

Anchor Glass, Warner Robbins, GA	http://www.oit.doe.gov/bestpractices/factsheets/newanchr.pdf
Corning, Greenville, OH	http://www.oit.doe.gov/bestpractices/factsheets/33895.pdf
OSRAM Sylvania, Exeter, NH	Not Yet Available

Metal Casting

AMCAST, Wapakoneta, OH	http://www.oit.doe.gov/bestpractices/factsheets/amcast.pdf
Ford Motor Company, Cleveland, OH	http://www.oit.doe.gov/bestpractices/factsheets/mc_cs_ford_cleveland.pdf

Mining

Coeur Rochester, Lovelock, NV	Not Yet Available
Peabody Energy, Gillette, WY	Not Yet Available

Petroleum

Equilon Enterprises, Martinez, CA	http://www.oit.doe.gov/bestpractices/factsheets/bp_cs_martinez.pdf
Paramount Refinery, Paramount, CA	http://www.oit.doe.gov/bestpractices/factsheets/petrol_cs_paramount_petroleum.pdf

Steel

Charter Steel, Saukville, WI	Not Yet Available
Crucible Specialty Steel, Syracuse, NY	Not Yet Available
North Star Steel, Wilton, IA	Not Yet Available
Sawbrook Steel, Cincinnati, OH	Not Yet Available

Supporting Industries

Jernberg Industries, Chicago, IL	Not Yet Available
Metaldyne, Royal Oak, MI	Not Yet Available
Metlab, Philadelphia, PA	http://www.oit.doe.gov/bestpractices/factsheets/metlab.pdf
SIFCO, Cleveland, OH	Not Yet Available
Utica Corp., Utica, NY	http://www.oit.doe.gov/bestpractices/factsheets/newutica.pdf

Other Industries

Cargill Dayton Corn Plant, Dayton, OH	Not Yet Available
Ford Motor Company, Wayne, MI	Not Yet Available
Hawaiian Commercial & Sugar Co., Puunene, HI	Not Yet Available

Cost-Share Awards for Plant-Wide Assessments

(continued from page 3)

Plant-wide assessments identify both energy and nonenergy savings potential. Nonenergy benefits may include productivity improvements, waste reduction, environmental improvements, and maintenance benefits. Chart 2 shows that although energy savings make up the largest share of identified savings, nonenergy benefits are significant and make up about one-third of identified savings.

Recommendations from a single plant-wide assessment often can be replicated in other plants. Chart 3 shows the impact of replication on overall savings potential when replication strategies are applied to other corporate facilities where processes, equipment, and energy requirements are similar. Note the lag time in Chart 3 reflects replication of assessments completed in previous years. (Read Alcoa's replication success story in this issue of *Energy Matters*. North Star Steel, Rohm and Haas, and Weyerhaeuser have also reported replication activities in various industry forums.)

Completing a plant-wide assessment is just the starting point. Project implementation priorities and schedules are determined by the company. Expenditure of capital funds also requires planning time. Therefore, time lags may exist between when a plant-wide assessment's energy efficiency projects are identified and when these opportunities can be implemented. To date, 21 plants have implemented energy-efficiency projects identified during their assessments. These plants identified more than \$123 million a year in combined potential cost saving, and almost \$72 million a year worth of savings have already been realized (see Chart 4). Chart 4 also shows the contribution of replication.

Implementation of plant-wide assessment opportunities may also lead to significant reductions in carbon and carbon dioxide (CO₂) emissions. Such reductions can enhance a plant or industry's standing as an environmental steward, an important benefit for many sectors of U.S. industry.

Chart 1. Cumulative Annual Savings Identified from Plant-Wide Assessments

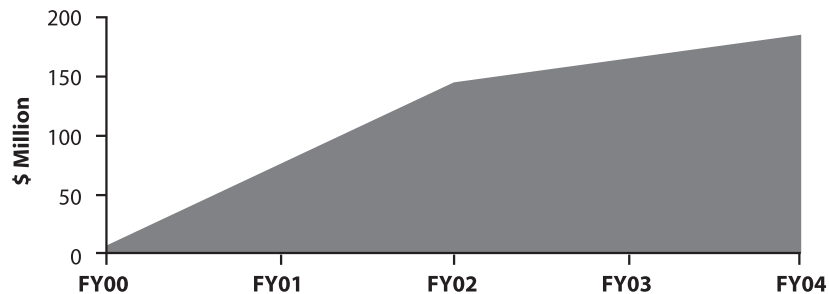


Chart 2. Cumulative Energy vs Nonenergy Annual Savings Identified from Plant-Wide Assessments

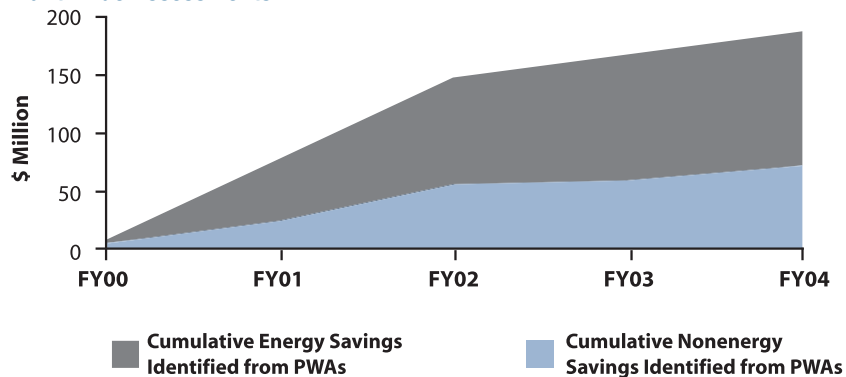


Chart 3. Additional Annual Savings Identified Through Replication

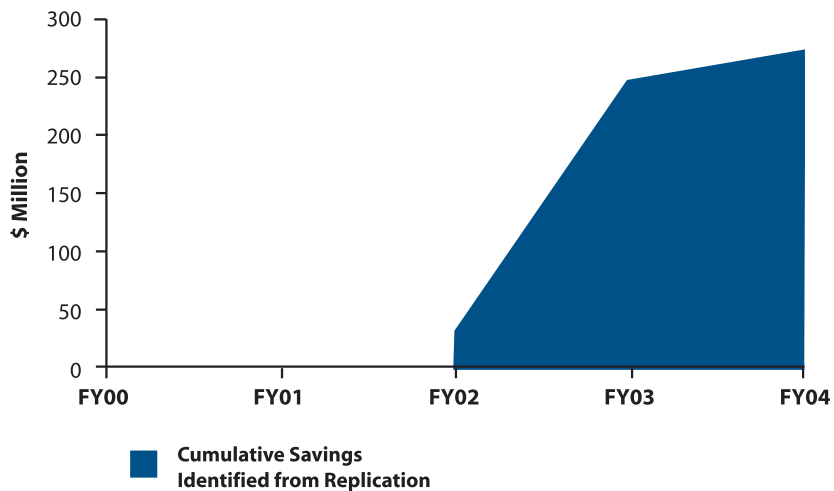
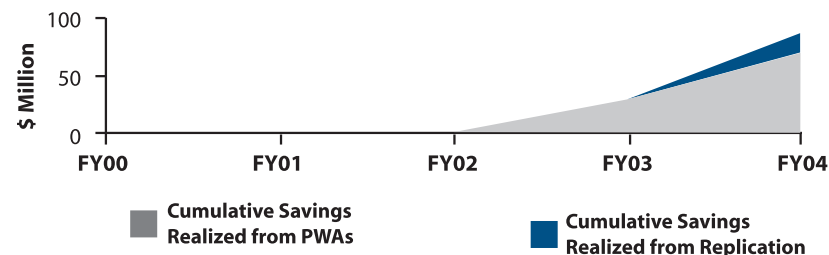


Chart 4. Cumulative Annual Savings Realized from Plant-Wide Assessments



Industry Leaders Talk About Plant-Wide Assessment Benefits

The goal of a plant-wide assessment is to identify specific project recommendations and their likely effects on costs and production efficiency. These projects can have positive effects on your plant's energy use, process efficiency, and bottom line. Read these testimonials to learn about some of the benefits your plant may see as a result of a plant-wide assessment.

Aluminum Permanent Mold Casting Replication Has Yielded \$20 Million Annual Savings

"The plant-wide assessment initiated at Amcast's Wapakoneta, Ohio, operation resulted in 12 project recommendations that identified annual savings of approximately \$3.6 million. Actual savings realized after implementation were in the \$6 million range with the opportunity to replicate these results at 5 other manufacturing operations in the corporation. As a result of the replication, a total of approximately \$20 million has been captured through June 2004 with continuing savings expected from 2004 through 2005. Though energy savings is the primary driver in the assessment process, Amcast focused on process modifications to impact performance, which resulted in significant cost savings for the plant. The ability to identify and quantify savings opportunities would not have been achieved without the support of DOE and the PWA program."

--James VanWert, Vice President, Amcast Industrial Corp.

Pulp and Paper Assessment Identifies High-Return Projects

"A plant-wide assessment award from the DOE provided the seed money to undertake an electrical energy assessment at one of Weyerhaeuser's large pulp and paper facilities. This assessment identified the potential to reduce annual electrical energy costs by nearly \$3 million through improved energy management practices and high-return capital projects. One of the key lessons learned was that the Pumping System Assessment Tool (PSAT), developed by DOE, identified a larger opportunity for energy savings than traditional engineering methods."

--Thomas Dunn, Senior Engineering Specialist, Weyerhaeuser

Steel Castings

"The steps taken by Sawbrook Steel in reaction to the findings of the plant-wide assessment team have shown an immediate, positive impact on our plant costs, efficiencies, machinery performance, and personnel productivity. Being a small manufacturing firm we could not have undertaken the cost or personnel involvement that the PWA allowed. Due to the detail in the team's study, and the calculation of the capital payback time, it is an easy decision to make to continue to put into effect the energy and cost savings recommendations."

--Mickey Beyersdorfer, President, Sawbrook Steel Castings

Aluminum

"We have conducted PWAs with DOE at our plants in Lafayette, Indiana, and Bauxite, Arkansas, and have replicated the PWA process at Spanish Fork, Utah; Cressona, Pennsylvania; and Baltimore, Maryland. These assessments, together with another PWA at the Plant City, Florida facility, identified over \$6.5 million in savings opportunities for Alcoa with over \$3.7 million being realized to date. The PWAs also led to the formation of Alcoa's Energy Efficiency Network with more than \$60 million in savings opportunities identified, of which over \$15 million has been captured to date. Alcoa has reduced NO_x by over 770 metric tons per year, SO_x by over 1,600 metric tons per year, and CO₂ by over 420,000 metric tons per year. The PWAs have been great for Alcoa and for the environment."

--Garry L. Goehring, Manager Environmental Engineering, Alcoa

Automotive Casting

"Ford's Cleveland plant has always aggressively looked at energy, but with the assessment, we had an opportunity to bring in some fresh eyes to take a look. And they did uncover some things that, honestly, we'd looked at in the past, but kind of lost sight of. So it was very beneficial."

--Bill Ziemba, Supervisor Energy Leadership, Ford Power Train Operations

Chemicals

"At Rohm and Haas' largest facility in Houston, multiple energy projects with various levels of DOE support...have resulted in over \$18.5 million in cost savings per year and 4.25 trillion British thermal units per year combined fuel and power savings. Rohm and Haas is continuing to conduct PWAs on our own to identify and implement energy and efficiency savings at our facilities around the world."

--Ray Baker, Energy Manager, Rohm and Haas

Alcoa Teams with DOE to Reduce Energy Consumption

As the world's leading producer of aluminum, Alcoa's long-term strategy for remaining competitive includes goals for using energy more efficiently. To accomplish this objective, Alcoa began working DOE in 1999 to identify opportunities for reducing energy consumption at its aluminum processing facilities. By performing plant-wide energy assessments, conducting employee training, and using DOE software tools and technical resources, Alcoa has identified more than \$60 million in savings opportunities, and has reduced its operating costs by more than \$15 million.

Alcoa's consumption of nonpotroom (smelting process for aluminum) fuel and energy as of the end of 2003 was \$700 million per year. The company's strategic environmental plan calls for savings of \$100 million a year through energy efficiency and environmental management. By 2006, Alcoa expects savings of \$60 million by improving energy efficiency and \$40 million from environmental management.

Alcoa takes an aggressive approach to its energy conservation program, in the same way it addresses environmental issues. The company formed an Energy Efficiency Network, made up of internal Alcoa experts, outside energy consultants, and selected vendors, and worked with DOE tools and resources to conduct energy assessments at locations worldwide identifying potential energy savings opportunities. Alcoa wants to use natural resources wisely and leave the neighborhoods where it operates better for having Alcoa in their communities.

Alcoa has clear goals for measuring progress toward achieving the 2020 strategic plan for cleaner air, better use of land and water, and the protection of human health. Alcoa's plan calls for ultimately eliminating landfill waste, reaching zero discharge of process water, and achieving significant reductions in emissions. The company has set interim targets on the way to sustainability.

For base year 2000, Alcoa plans to reduce:

- Sulfur dioxide (SO₂) production by 60% by 2010
- Volatile organic compound emissions by 50% by 2008
- Nitrogen oxides (NO_x) emissions by 30% by 2007
- Mercury emissions by 80% by 2008
- Landfill waste by 50% by 2007

(continued on page 6) ►

Alcoa Teams with DOE to Reduce Energy Consumption (Continued from page 5)

- Process water use and discharge by 60% by 2008.

Additionally, starting from base year 1990, the company is working to:

- Reduce greenhouse gas emissions 25% by 2010
- Implement effective environmental management systems, such as ISO 14001, at all locations by 2005
- Achieve zero environmental noncompliance incidents
- Save \$100 million annually by 2006 by eliminating wasteful practices and designing facilities for sustainability
- Incorporate environmental targets and community relationship objectives into all Alcoa businesses' annual plans.

Alcoa is making progress in all these areas. The company's annual sustainability report and Web site at www.Alcoa.com provide updated information.

DOE and Alcoa Partnership

To help achieve its aggressive goals, Alcoa teamed with DOE in 1999 and began identifying energy reduction opportunities. Since then, Alcoa has successfully used DOE tools and resources to improve energy efficiency. For example, the company has conducted energy assessments at individual Alcoa plants, hosted training to educate Alcoa employees about energy conservation, showcased and demonstrated technologies, and worked with DOE to establish an Energy Efficiency Network within the company.

Plant-Wide Assessments

Alcoa has participated in several cost-shared and other DOE energy assessments. By identifying areas of potential improvement and implementing projects, these plants have achieved impressive energy and cost savings. Through replication, 35 other Alcoa facilities have also reaped the benefits.

Lafayette Plant—In 2000, the Alcoa Lafayette Operations facility in Lafayette, Indiana, was the site of a plant-wide energy assessment. The project identified annual savings of more than \$1.9 million, with an estimated capital investment requirement of \$2.3 million. So far, the Lafayette Operations has realized more than \$1.5 million in annual savings after an investment of \$1.8 million.

Bauxite Plant—In 2002, the Alcoa Arkansas Operations facility, in Bauxite, Arkansas, conducted a plant-wide energy assessment. The project identified annual savings of \$1.07 million with an estimated capital investment requirement of \$649,000. The majority of the

savings were identified with the compressed air system. To achieve these results, the plant improved the system, which reduced air demand and improved electrical load management.

Plant City—In 2001, Alcoa's Plant City Operation, in Plant City, Florida, also conducted a plant-wide energy assessment. This project identified annual savings of \$740,000, with an estimated capital investment requirement of \$1.3 million. To date, the plant has realized \$185,000 of these savings.

DOE Showcase in Salt Lake City

In 2001, Alcoa's Spanish Fork Operations, in Spanish Fork, Utah, agreed to be a sponsor of the DOE Showcase event in Salt Lake City, Utah. DOE funded various energy efficiency projects that identified \$3.3 million in potential savings throughout Alcoa with a capital investment of \$4.8 million. To date, Alcoa has realized \$1 million of these savings from showcase activities.

Spanish Fork IAC Assessment—In conjunction with the Salt Lake City Showcase, Spanish Fork was the site of an assessment by Colorado State University's Industrial Assessment Center (IAC). The university-based team helped the plant identify annual savings of \$740,000 with an estimated capital investment requirement of \$576,000. To date, Spanish Fork has achieved savings of \$740,000.

DOE Collaborative Targeted Assessments—Also in conjunction with the Salt Lake City Showcase, DOE performed Collaborative Targeted Assessments (CTA) at the following Alcoa plants to identify energy savings opportunities for specific operations:

- Cressona, Pennsylvania: conducted a pumping system assessment
- Plant City, Florida: conducted a process heating assessment
- Elizabethton, Tennessee: conducted a compressed air assessment.

Training—Alcoa has also helped its employees become more proficient in managing energy systems, by hosting DOE's BestPractices training sessions. A training seminar for the Alcoa Engineered Products Business Unit in Baltimore, Maryland, focused on compressed air, motors and pumping systems, and variable speed drives. The potential savings from 30 Alcoa employees attending the training is estimated at \$165,000.

DOE-Developed Technology Demonstrations—Alcoa evaluated the following DOE-developed technologies as part of the DOE Salt Lake City Showcase:

- **Air/Oxy-Fuel Burners:** This is burner technology for aluminum melters. The energy savings are offset by the cost of oxygen. The potential benefit is improved productivity, and Alcoa will review the project as product demand changes.
- **Vertical Floatation Meter:** This is a scrap melting technology. The return on investment (ROI) for this technology was evaluated; however, it does not meet Alcoa requirements.
- **Oscillating Combustion:** This combustion technology reduces energy consumption and decreases emissions of nitrogen oxides. The technology is being evaluated for possible use at Alcoa Cressona Operations and is being compared to alternative technologies so that optimal combustion technology can be selected for this application.

Allied Partner Agreement

An Allied Partner agreement between the DOE's Industrial Technologies Program (ITP) and Alcoa was executed in 2001. This agreement represents a shared, voluntary commitment to promote industrial energy efficiency. Since this agreement was established, Alcoa has used and applied BestPractices programs and services throughout its extensive network of aluminum processing facilities.

Allied Partners are industrial associates, manufacturers, industrial service and equipment suppliers, utilities, and other organizations that voluntarily work with DOE. Partners seek to promote increased energy efficiency and productivity for industries that participate with ITP. The Allied Partner initiative began in 1995 under ITP's BestPractices, and today, more than 200 companies are Allied Partners.

ITP encourages energy-intensive industries to work together to create broad, industry-wide goals, identify specific needs and priorities through industry-led roadmaps, and form alliances to help achieve those goals. DOE's Allied Partner network exists ultimately to provide information and assistance to industrial manufacturers to improve the energy efficiency of their operations. Successful efforts of Allied Partners are publicized to promote their energy savings accomplishments.

Alcoa Energy Efficiency Network

Alcoa Energy Group has the task of managing the supply side of Alcoa's energy usage through the Alcoa Trustee Program. Alcoa Energy realized that Alcoa was missing a significant opportunity by not focusing on

the demand side as well. Early in 2002, Alcoa formed a team with Alcoa Energy, Alcoa Engineered Products, and Alcoa Primary Metals to develop a comprehensive program that focuses on the demand side of Alcoa's energy usage. With lessons learned from Alcoa's involvement with DOE, guidance provided by Sara Dillich of DOE, the expertise of knowledgeable energy consultants, and benchmarking of other company programs (such as Ford, Johnson Controls, Kodak, and 3M), Alcoa created a company-wide Energy Efficiency Network. The Network includes tools and resources for identifying energy savings opportunities.

Alcoa's energy conservation program began with North American locations, but is expanding worldwide, broadening the knowledge base to grow the program.

Key Factors for the Network

Alcoa's Energy Efficiency Network includes several key components to help ensure its success and accessibility. These include:

- A roadmap for success
- A voluntary network that allows locations to request their own assessments
- Top-level commitment to energy efficiency improvements
- Good communication through an Intranet Web site
- An approach that is consistent with the company's Continuous Improvements ABS (Alcoa Business System) Principles
- A focus on DOE's BestPractices replications approach
- A program to train internal Alcoa energy efficiency experts
- Local commitment to energy projects
- A tracking system to report project results company wide
- Recognition of achievements.

How the Energy Efficiency Network Works

Individual Alcoa plants can access the Energy Efficiency Network following this approach:

- An Alcoa location requests an energy efficiency assessment.
- Alcoa Energy conducts a pre-assessment on location to determine the extent and resources needed for the assessment.
- Alcoa Energy and the plant jointly develop a specific plan and identify resources for the assessment. The plan includes training, if the location requests it.
- Internal and external (as needed) resources

conduct a 2- to 5-day assessment of the location. The plant covers the costs for external resources, but Alcoa Energy's resources are free to the location.

- The plant reviews and approves assessment findings, and then the Alcoa Energy assessment team issues a final report.
- Energy projects are entered in the Intranet database. The plants update information as projects progress.
- Findings are communicated throughout Alcoa best practices, case studies, assessment findings, and actual results of completed projects.

Network Results as of 2003

In its first 18 months, the Alcoa Energy Efficiency Network has helped the company achieve significant energy and cost savings, and has helped reduce emissions. As of the end of 2003, the Network reports:

- A total of 35 Alcoa facilities have received assessments
- Approximately 40 best practices were identified
- More than \$60 million in savings opportunities have been identified. Of these potential savings:
 - Alcoa plants have committed \$40 million to pursue the energy savings opportunities
 - 20% of the opportunities can achieve savings through "no-cost" projects
 - 80% of the opportunities could be realized through projects with less than 2-year paybacks
- More than \$15 million has been captured to date.
- An Intranet Web site was developed for easy access by all within Alcoa
- Biannual Energy Summits are being conducted by Alcoa Energy to provide updates on the program, recognize achievement, and present case studies and training.

In addition to saving energy, Alcoa has also reduced emissions of NO_x, SO_x, and carbon dioxide (CO₂).

Energy Management: A Corporate Commitment

Alcoa finds many benefits to its corporate energy management approach. These include reduced energy use, energy costs, and emissions. In addition, the company-wide philosophy encourages employee involvement in process improvement, and boosts Alcoa's image locally, regionally, and globally.

Several elements combine to make the strategy work for Alcoa. They are:

- An energy policy endorsed by management and a plan to launch this effort.
- Employee and plant-level involvement as a foundation. Plants participate voluntarily and have sole responsibility for decision making to implement their own projects.
- Network participants who are energy champions at their sites. These energy champions take part in assessments. They buy in to the process, which leads to "ownership" and drives implementation of projects.
- Carefully selected consultants and vendors. They recognize that individual locations receive the credit for savings opportunities and understand the goals and objects of the Energy Efficiency Network.

In its search for stable, long-term energy supplies, Alcoa is committed to energy conservation and decreased reliance on fossil fuels. Where possible, Alcoa will increase use of natural, renewable energy sources to help lower CO₂ emissions and address global climate change.

Following Alcoa's example, other industrial companies can develop their own strategies to meet corporate goals, such as improving energy efficiency, cost efficiency, and productivity. In doing so, they can strengthen employee commitment and corporate identity and enhance environmental performance.

ALCOA PUBLISHED CASE STUDIES

To recognize Alcoa's success in identifying energy savings, DOE has published the following case studies:

- Corporate Energy Conservation Program for Alcoa North American Extrusions (Management Case Study)
- IAC Energy Assessment of Spanish Fork Plant (Assessment Case Study)
- Alcoa North American Extrusion Implements Energy Use Assessments at Multiple Facilities (Assessment Case Study)
- Power Factor Study Reduces Energy Costs at Aluminum Extrusion Plant (Technical Case Study)
- Plant-Wide Energy Assessment Finds Potential Savings at Aluminum Extrusion Facility (Assessment Case Study for Plant City, Florida)
- Alcoa Lafayette Operations Energy Efficiency Assessment (Assessment Case Study)
- Alcoa World Alumina: Plant-Wide Assessment at Arkansas Operations Reveals More than \$900,000 in Potential Annual Savings (Assessment Case Study)

These case studies are available online at www.eere.energy.gov/industry/bestpractices, or order copies by calling the EERE Information Center at 1-877-337-3463.

Coming Events

PROCESS HEATING ASSESSMENT, CLEVELAND, OH

- Sep 21, 2004 For more information, contact Deborah Oates at doates@steel.org or 202-452-7205

PUMPING SYSTEM ASSESSMENT, IRWINDALE, CA

- Sep 28, 2004 For more information, contact Chris Lydoff at chris.lydoff@sce.com or 626-812-7370

OPTIMIZING STEAM SYSTEM PERFORMANCE, MILWAUKEE, WI

- Sep 28, 2004 For more information, contact Adam Hudson at ahudson@ase.org or 202-530-4356

FUNDAMENTALS OF COMPRESSED AIR SYSTEMS (LEVEL 1), ARLINGTON, TX

- Oct 5, 2004 For more information, contact Kathey Ferland at kferland@mail.utexas.edu or 512-232-4823

PUMP SYSTEM SPECIALIST QUALIFICATION, CHARLOTTE, NC

- Oct 19-20, 2004 For more information, contact Cheryl Mead at cmead@pumps.org

STEAM SYSTEM ASSESSMENT, ATLANTA, GA

- Oct 31, 2004 For more information, contact Martha Quinlin at mquinlin@tappi.org or 770-209-7399

BestPractices

The Industrial Technologies Program's BestPractices initiative and its *Energy Matters* newsletter introduce industrial end users to emerging technologies and well-proven, cost-saving opportunities in motor, steam, compressed air, and other plant-wide systems.

A STRONG ENERGY PORTFOLIO FOR A STRONG AMERICA
Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.



EERE INFORMATION CENTER

Do you have questions about using energy-efficient process and utility systems in your industrial facility? Call the Energy Efficiency and Renewable Energy (EERE) Information Center for answers, Monday through Friday 9:00 a.m. to 7:00 p.m. (EST).

**HOTLINE: 877-EERE-INF
or 877-337-3463**

DOE Regional Office Representatives

- David Godfrey, Atlanta, GA, 404-562-0568
- Stephen Costa, Boston, MA, 617-565-1811
- Brian Olsen, Chicago, IL, 312-886-8479
- Jamey Evans, Denver, CO, 303-275-4813
- Chris Cockrill, Seattle, WA, 816-873-3299
- Claudia Marchione, Philadelphia, PA, 215-656-6967



U.S. Department of Energy Energy Efficiency and Renewable Energy

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

This document was produced for the Office of Energy Efficiency and Renewable Energy at the U.S. Department of Energy (DOE) by the National Renewable Energy Laboratory, a DOE national laboratory.
DOE/GO-102004-1982 • August 2004

Printed with a renewable-source ink on paper containing at least 50% wastepaper, including 20% postconsumer waste

Golden, CO 80401-3393

1617 Cole Boulevard

National Renewable Energy Laboratory

Energy Matters

PRSR STD
U.S. Postage
PAID
Permit No. 258
Golden, Colorado