

Energy Efficiency Toolkit For Manufacturers

Eight Proven Ways To Reduce Your Costs

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Introduction

Energy prices are on the rise again and supply restraints are showing up in many parts of the country. How manufacturers respond to tighter energy markets will increasingly affect their business performance and profitability.

Fortunately, energy efficiency comes naturally to manufacturers because it is an application of total quality management that eliminates waste in the production process. Technological advances and the application of total quality management in the workplace have spurred an extraordinary growth in manufacturing productivity over the past decade.

This energy-efficiency toolkit, published by the National Association of Manufacturers and its research and education arm, The Manufacturing Institute, was created to help make saving energy a part of manufacturers' and employees' daily routine. NAM members recently shared their energy-saving secrets, as part of a survey the NAM and the institute conducted in

spring 2000. More than 400 manufacturers participated in the survey, which revealed that 85 percent have made energy-efficiency improvements over the past five years. Simple measures that reduce energy use by just 10 percent can shave as much as \$18 billion off energy-consumption costs.

The toolkit features eight energy-efficiency success stories, as well as a guide to dozens of public and private resources that can help your company reduce energy waste and increase productivity.

This toolkit is for you and your employees, suppliers and customers; as well as the local media and government officials. I encourage you to distribute it among these groups. We are also placing this publication on our Web site so a wide audience can access the information easily. Empowering everyone with whom you work will lead to the exchange of great ideas for saving your company energy, decreasing waste and boosting your bottom line.



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President,
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For the complete, online version of this toolkit, visit The Manufacturing Institute Web site at www.nam.org/institute.

Acknowledgements

Many people helped develop this toolkit, and The Manufacturing Institute and the NAM are grateful for all their contributions.

First and foremost, we would like to thank the more than 400 companies that participated in the spring 2000 survey of manufacturers on energy efficiency. It is their experience in saving energy and reducing their costs that forms the basis of this report.

We are especially grateful to the companies who supplied the information in each of the best practices sidebars: Samsonite Corp., The Timken Company, Stenner & Co., Hyde Manufacturing Co., Pitney Bowes Inc., G&S Titanium, Merck & Co. and Pfizer Inc. Their success stories clearly illustrate what steps they took to save energy and how they communicated to their employees and communities.

Thanks to Mark Whitenon, NAM's vice president for resources, environment and regulation; and to Barb Haig, president of Barbara Haig

Communications. Both of them helped develop the content and organization of the survey and provided invaluable advice each step of the way.

Bill Paul, a professional writer and journalist in Westfield, N.J., conducted the company interviews and wrote much of this report. He developed this publication in close association with Mike Arny and Steve Olson at the Leonardo Academy in Madison, Wis. All three have an impressive understanding of energy use and energy markets; their insight was critical.

We also want to thank the NAM Publishing Department, especially Kevin Sullivan for the layout and design; Ingrid Davitt for many good suggestions and the final edits; and Quintina Kornegay for the printing arrangements. Jason Vaughan, associate director of the institute, added his invaluable editorial expertise. Bill Canis, executive director of the institute, supervised the entire project, including editorial direction and coordination with other departments.

Energy Efficiency in Manufacturing

Survey Results

Overview. In spring 2000, The Manufacturing Institute conducted a survey of manufacturers to gain insight on their energy efficiency practices. Manufacturing accounts for more than 40 percent of all energy use in the United States. It was responsible for 22 percent of U.S. economic growth in the 1990s, more than any other sector. Understanding what manufacturers are doing in the area of energy efficiency is an important prerequisite for holding meaningful public policy discussions on America's economic future.

This report summarizes the findings of The Manufacturing Institute survey of more than 400 manufacturers. It will help Congress, the media and the general public better understand current trends of manufacturers in energy efficiency.

Over the past five years, a vast majority of U.S. manufacturers have improved the energy efficiency of their U.S.-based plants and offices. Even though the relative price of energy increased only slightly during this period, large and small users alike chose to make improvements in a number of broad areas, namely lighting; heating, ventilating and air-conditioning systems (HVAC); and plant motors and machinery.

Reasons for Efficiency Investments. Not surprisingly, manufacturers' primary motivation was the desire to

save money. That aside, manufacturers acted more out of a voluntary commitment to a better environment than because of any regulatory requirements. While nearly 60 percent foresee electricity restructuring saving them up to 20 percent on their utility bills, a significant number would consider taking additional voluntary steps, such as developing an energy efficiency information campaign for employees. Approximately 85 percent of respondents answered "yes" when asked, "Has your company undertaken energy efficiency actions in the past five years?" Of that 85 percent, approximately four out of five said the "most important" reason why they had improved their facilities' energy efficiency was to "save money." Specifically —

- about three-fourths made lighting-efficiency improvements in some or all of their plants, while nearly half did so in some or all of their offices;
- more than half made HVAC improvements in both their plants and offices;
- more than half improved the efficiency of motors and machinery in some or all of their plants;
- nearly four in 10 trained facility managers in energy efficient practices; and
- approximately one in three benchmarked against baseline energy use.

Small users of energy were almost as likely to have made productivity-enhancing efficiency improvements as large users. For example, among respondents who reported annual energy costs between \$25,000 and \$50,000 a year, more than 55 percent said they had made HVAC improvements in at least some of their offices.

Helping the Environment. Nearly 40 percent ranked “voluntarily helping the environment” as their second most important reason for improving the energy efficiency of their U.S. facilities. Following environmental emissions regulations ranked as a distant third, followed by “improving community relations” and “requested by customers.”

Additional Voluntary Environmental Steps. Energy efficiency is just one of a number of voluntary pro-environmental activities engaged in by U.S. manufacturers. More than three-fourths reported that they reduce, reuse and recycle non-regulated materials. More than 40 percent said they voluntarily reduce emissions and discharges beyond regulatory requirements. These are additional voluntary steps to improve energy efficiency they would consider taking:

- nearly 40 percent said they would consider developing an employee energy efficiency information campaign (10 percent already have one);

- more than 30 percent said they would consider promoting car pooling and mass transit (13 percent do so now); and
- more than 25 percent said they would consider using alternative fuel sources for their corporate fleets of vehicles (less than 4 percent currently do).

Involving Employees in Efficiency.

Interest in developing employee energy efficiency information campaigns was strong among both small and large energy users. Nearly 40 percent of respondents with annual energy costs between \$25,000 and \$50,000 said they were interested in starting such a campaign, compared with the roughly 52 percent with annual energy costs of \$20 million or more.

Government Programs. While U.S. manufacturers are keen on voluntarily improving energy efficiency, most have chosen not to participate in voluntary government energy efficiency programs and organizations. More than half of respondents reported they are “not involved” in such programs. Of those who are involved, most said they participate in state or local programs, not in programs directly run by the U.S. Department of Energy or by the U.S. Environmental Protection Agency.

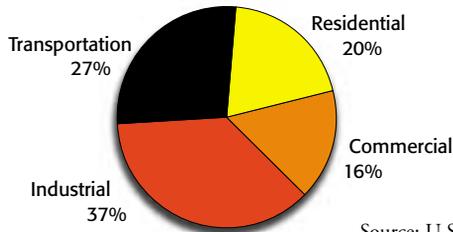
Manufacturers' Energy Use

Manufacturers Use Energy More Than Any Other Sector

No segment of American society has as much to gain from energy efficiency as the manufacturing sector, as the chart below illustrates. Manufacturers are affected directly by the energy cost of making products (industrial); main-

taining office operations (commercial); receiving raw materials and delivering finished goods (transportation) and employees' household energy costs (residential), which have an indirect impact on a manufacturer's wage scales.

1998 U.S. Consumption by Sector



Source: U.S. Department of Energy

Manufacturing Sector Energy Consumption by End Use

The energy used by a manufacturer to make goods — in process heating and machine drive — dwarfs all other direct-end uses combined, as Table 1 shows. Manufacturers should probably concentrate first on making energy efficiency improvements in these two areas. Of

nearly equal importance, however, is indirect end use (primarily boiler fuel). Other direct-end improvements (such as HVAC and lighting) should probably be combined into one all-encompassing efficiency-improvement project, in order to maximize cost-effectiveness.

Table 1: Manufacturing Sector Inputs for Heat, Power and Electricity Generation by End Use

Industrial Sector End-Use Category	Trillion BTU	Percent of Total Direct-End Use
Indirect-End Use (Primary Boiler Fuel)	3,669	
Direct-End Use	6,739	
Direct-End Use		
Process Heating	3,466	51.4%
Machine Drive	1,489	22.1%
Facility Heating, Ventilation and Air Conditioning	588	8.7%
Conventional Electricity Generation	351	5.2%
Electrochemical Processes	271	4.0%
Facility Lighting	185	2.7%
Process Cooling and Refrigeration	161	2.4%
Other Direct-End Uses	228	3.4%
End Use Not Reported	279	
Total	10,687	

Source: Prepared by the Leonardo Academy from U.S. DOE/EIA data for 1994, *Annual Energy View 1998*, published July 1999. HVAC excludes steam and hot water.

The Eight Best Practices For Improved Energy Efficiency

1

Increase the Efficiency of All Motors
And Motor-Driven Systems

2

Improve Building Lighting

3

Upgrade Heating, Ventilating
And Cooling Systems

4

Capture the Benefits
Of Utility Competition

5

Empower Your Employees To Do More

6

Use Water-Reduction Equipment and Practices

7

Explore Energy Savings Through
Increased Use of the Internet

8

Implement Comprehensive Facility Energy
And Environmental Management

1. Increase the Efficiency of All Motors And Motor-Driven Systems.

Samsonite Corporation

Denver-based Samsonite Corp. is one of the world's largest manufacturers and distributors of luggage, marketing its products primarily under the Samsonite®, American Tourister® and Lark® brand names.

As part of a motor-efficiency improvement program, the company installed nine high-efficiency, variable-frequency-drive motors on injection-molding machines. The cost was \$200,000 — nearly half of which was paid by the local utility, Public Service Company of Colorado, as part of its Custom, Industrial Process Efficiency Solutions program. The new motors reduced energy use by 50 percent, saving Samsonite approximately \$92,000 and generated an additional annual savings of nearly \$40,000, stemming from reduced expenditures for emergency maintenance, oil, absorbents, mold repairs and waste disposal.

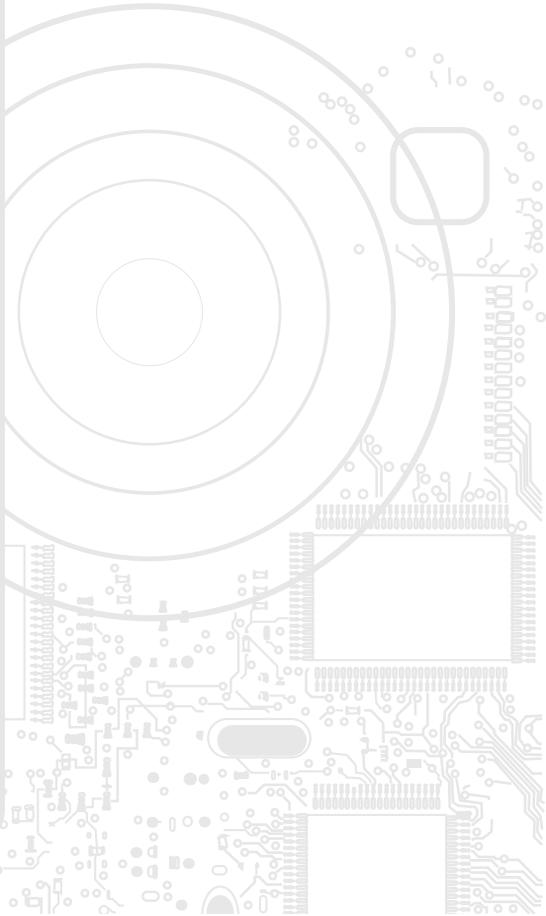
The payback on this project occurred after only eight months: the amount of electricity needed to produce a piece of luggage was reduced by a healthy 10 percent. In addition to these motor improvements, Samsonite has also installed efficient lighting; added highly efficient swap coolers when it expanded its air-conditioning system; communicated its improvements through the Cleaner and Greener™ program; and reduced water use with an innovative humidity-controlled irrigation system.

These actions have dramatically trimmed Samsonite's energy bill by \$275,000 a year. Kermit Hodge, director of environment, health and safety at Samsonite, says, "These projects just make good business sense; they're no brainers."



The higher a motor's efficiency, the lower its operating costs. The more motors a manufacturer upgrades, the more energy-efficient the manufacturing process will be. And the more energy efficient a manufacturer is, the lower the total operating costs and the more competitive in the marketplace.

KEY TO SUCCESS: Regular maintenance keeps motors running efficiently and identifies problems before a breakdown. Know ahead of time where to find high-efficiency replacement motors, so that you can minimize down time when existing motors break down.



2. Improve Building Lighting

Installing high-efficiency lighting systems and using daylight will not only lower your lighting costs, it will also improve lighting quality. Think of day lighting as free light that may also improve worker performance, just as it's been shown to improve students' academic performance. The sleeper bonus here is increased productivity.

KEY TO SUCCESS: Combining a lighting-improvement project with other energy efficiency projects will keep costs down.

The Timken Company

The Timken Company is an international manufacturer of highly engineered bearings and alloy steels. One of the company's global business units, Timken Aerospace, located in Lebanon, N.H., manufactures ball and roller bearings and employs 700 people.

Steve Davis, manager of mechanical services for Timken Aerospace, learned about the new high-efficiency T5 fluorescent lights during a 1998 energy efficiency workshop, sponsored by the New Hampshire Governor's Office of Energy and Community Services. With the help of state energy officials and the local power supplier, Davis developed a lighting-improvement project that is saving his company more than \$100,000 a year in lighting costs, plus an additional \$40,000 a year in HVAC expenditures. He replaced existing metal halide fixtures with high-intensity, fluorescent fixtures that cut energy consumption roughly in half. The new lighting, which uses a thinner (T5) fluorescent lamp, also improves lighting quality.

The project required replacing about 550 major fixtures and cost roughly \$370,000. Granite State Electric Co. contributed nearly \$100,000 through its demand-side management program. The project paid for itself in less than two years. Timken Aerospace cut its energy consumption by nearly 1.5 million kilowatt hours annually and its power load by about 190 kilowatts.

An added benefit of this public-private partnership was that, by reducing electrical energy use, Timken cut air pollution from fossil-fuel power plant emissions. By saving 1,480,000 kilowatt hours of electricity annually, Timken is reducing sulfur oxide emissions by 8.88 tons annually; and nitrogen oxide emissions by 3.7 tons.



3. Upgrade Heating, Ventilating And Cooling Systems

Stenner & Co., Inc.

During recent construction, Stenner & Co., Inc., a Jacksonville, Fla.-based manufacturer of chemical metering pumps, replaced two old air-conditioning units with five new energy efficient units. In addition to helping cut energy costs by about 18 percent a year, the new units have improved worker productivity by creating more favorable operating conditions, says Steve Hayes, manager of purchasing and materials.

The new units provide “zoned” cooling, meaning that more cool air goes where it’s needed most — on the hot-running machines — rather than on the workers. “We used to have workers who’d be freezing,” says Hayes. Since the new equipment was installed, “our people are working harder; they can see this was done for them.”

In addition to installing more efficient AC units, Stenner upgraded its chillers and installed new computer-controlled machinery for its 7,000 square-foot manufacturing facility. The total cost was about \$35,000, with a four to five year anticipated pay-back period. While Hayes strongly recommends that manufacturers upgrade their HVAC equipment, he suggests that such a project be done when an expansion or other construction is already disrupting a manufacturer’s normal working environment.



Higher-efficiency HVAC equipment, and more effective computer control of how and when that equipment is used, can substantially lower your HVAC costs. Even simple steps, such as reducing HVAC output on weekends and at night, can make a big difference in overall plant and office energy-use that can only add to a manufacturer’s competitiveness.

KEY TO SUCCESS: If you upgraded your HVAC systems 10 years ago or more, it is time to check if new technology has made it cost-effective to do so again.

4. Capture the Benefits of Utility Competition

Whether or not your state has deregulated its electric and natural gas industries, you can use your local utility or an independent energy services company (ESCO) to lower energy costs through innovative procurement and demand-side management programs.* Utility companies know that they are (or soon will be) competing for every commercial and industrial customer, a situation manufacturers can take advantage of by asking for free energy audits and bill-tracking software — both of which give you a clearer picture of how energy is being used. If power reliability is a concern, ask about installing on-site power-generation equipment.

KEY TO SUCCESS: Energy-management systems measure energy use and monitor peaks and valleys, putting manufacturers in a better position to control use, avoid high rates and negotiate with utilities. Closely tracking your energy bills could pay for itself just from the billing errors you may uncover. If possible, find the utility or ESCO that wants to partner with you to reduce costs. Develop a fuel-management strategy to profit from price volatility in fuels.

* The U.S. government is already learning how to use local utilities to cut energy costs. When one of the biggest energy users in the world, the U.S. Defense Department, was ordered by the President to cut energy costs and significantly reduce greenhouse gas emissions, it turned to an outside energy efficiency team from Pepco Energy Services Inc., a wholly owned, separately managed subsidiary of Potomac Electric Power Co. Working with engineering firm Viron Energy Services, Pepco Energy Services developed a comprehensive, multi-year, energy efficiency improvement program for hundreds of DOD buildings on five military installations. The plan features lighting retrofits and replacements; cooling-system retrofits and replacements; air-handling unit replacements and retrofits; central-heating plant upgrades (new gas-fired boilers); central-cooling plant upgrades (a new absorption chiller and chilled-water distribution line); plus extensive water and wastewater-conservation measures. The plan is expected to

Hyde Manufacturing Company

“At first it sounded too good to be true,” says Louis Koslowski, manager of plant engineering for Southbridge, Mass.-based Hyde Manufacturing Co. After five major energy efficiency improvement projects in 15 years — the last in 1999 — all coordinated by Hyde’s local electric utility, Koslowski says manufacturers would be unwise not to try to partner with their local power firm. Over the years, Hyde has gotten rebates and other cash incentives totaling roughly \$200,000 for installing new lighting (in both plants and offices), variable-speed-drive motors and a water chiller, plus upgrading a vacuum furnace and a water-filtration system.

These various projects not only have helped keep Hyde’s \$750,000-a-year energy costs under control, they also have helped lower water expenditures. The key, says Koslowski, is to “get the utility involved right at the beginning.” In Hyde’s case, the utility, Massachusetts Electric Co., “figured everything out for us and, after determining we qualified under set guidelines, wrote a check that generally covered close to 50 percent of the up-front costs.” With more than 300 employees, Hyde Manufacturing makes putty knives, scrapers and other machine tools.



result in an annual energy savings of up to 17 percent. It is further intended to meet the President’s overall objective of a 30-percent reduction in emissions by federal agencies. The program has already generated widespread publicity. These capital improvements are being financed by the Pepco/Viron team, eliminating any cost to taxpayers — an option that every private manufacturer can also pursue.

5. Empower Your Employees To Do More

Pitney Bowes Inc.

Pitney Bowes Inc., the Connecticut-based \$4.4 billion global provider of mail and messaging management equipment, succeeds in communicating its corporate environmental efforts, both internally and externally.

Employees regularly get a corporate environmental newspaper that's full of energy-saving tips and advice. When employees open their paychecks, they may be greeted by messages that encourage them to save energy by turning off their desktop computers. The company notifies every employee via e-mail whenever there's a potential power crisis, urging workers to help out by pulling down shades and taking other voluntary steps. Externally, the company recently became a founding sponsor of Greenbiz.com, an online environmental resource center that helps corporations "align environmental responsibility with business success."

Pitney Bowes also uses direct media outlets, such as the Connecticut Business and Industry Association, plus indirect outlets like Business Wire, to distribute environmentally oriented press releases. When the company has a special event, such as the installation of a cogeneration unit, it airs the event on TV and other local media. "We're always trying to raise awareness," says Michael Gilbert, senior corporate environmental engineer. Awareness is a key ingredient of the company's Managing Energy Wisely Program which, since 1997, has trimmed corporate energy consumption by 15 percent on a weather normalized basis — enough BTUs of energy to power 40 households.



Energy efficiency both directly and indirectly adds to manufacturers' bottom lines, directly by cutting a company's utility bills; indirectly if manufacturers communicate what they've done (and plan to do) to save energy. Keeping employees informed about what's going on will enable and empower them to seek additional savings that will further reduce your costs. Your marketing employees can also make use of your energy efficiency in positioning the company with customers. In addition, the more employees know about your energy savings, the more likely they will tell their friends in the community. Keeping the media up to date on your efforts will generate positive publicity that may translate into new business, as well as maintain good relations with government officials.

KEY TO SUCCESS: Keep your employees, customers and communities posted on your improvements through internal and external newsletters, mailings, e-mail announcements, the Internet and intranet, and press releases.

6. Use Water-Reduction Equipment and Practices

Saving water leads to energy savings: Reducing water use decreases the energy needed to pump, heat or chill water. With water on the verge of becoming a scarce commodity in parts of the United States, manufacturers can expect to see their water and sewage bills climb steadily in coming years. Installing new water-reduction equipment, as well as altering manufacturing processes so that less water is used and wastewater is captured and re-used, will help keep your water bills in check and sends a readily understood message to the media and the public that your company is concerned about the environment.

KEY TO SUCCESS: Install closed-loop systems that will enable water to be used over and over. Identify how water is used in your facilities: where, how, how much and for what purpose.

G&S Titanium, Inc.

Wooster, Ohio-based G&S Titanium, Inc., is a small, 50-employee firm that processes titanium for manufacturers of springs, tanks and other products. As part of its manufacturing process, G&S runs the titanium through a descaling salt bath, in which salt that's been heated to the point where it's a liquid is used to remove the oxide scales from the metal. Electrodes keep the salt hot, while water keeps each electrode's power-delivery components cool.

Instead of simply using grid-supplied electricity to cool that water, G&S installed a rooftop heat exchanger that uses natural air currents. It's all part of a closed-loop system that paid for itself in less than one year and is saving the company \$5,000 worth of electricity annually. G&S next plans to capture the steam generated by the boiling of its wastewater, and use that steam to power the boiling system, effectively making that piece of equipment energy efficient. This system could save the company as much as \$13,000 a year in natural gas costs.

G&S has made other changes that are saving the firm hundreds of thousands of gallons of water per year. For example, to save water, it switched from clean water tanks to dirty water rinse tanks that do not have to be frequently refilled. It uses a high-pressure washing system and a water misting system to clean the rinsed titanium.



7. Explore Energy Savings Through Increased Use of the Internet

Merck & Co., Inc.

Merck & Co., Inc., a New Jersey-based global pharmaceuticals research and development firm, intends to use the energy efficiency lessons learned from two pilot projects at Merck plants in New Jersey and Pennsylvania. Via the Internet, the company hopes to spread the efficiency information and the development of these practices with all other Merck facilities around the world including 31 plant locations in 18 different countries. Merck's goal is to create a best-practices information site, which will be continuously updated as new and better energy efficiency practices are implemented, and is readily accessible by all of Merck's 62,000 employees. Merck plans to have this company-wide effort up and running within two years.



As an extremely effective communication tool, the Internet has the potential to help manufacturers save energy in a variety of ways. An Internet-based, energy-management system can provide more precise control of energy use throughout a plant or office. Such a system may be especially useful for multi-site manufacturers seeking to consolidate energy procurement across several states or regions. You can also save energy by allowing more employees to telecommute. Transportation energy also may be saved by using the Internet for videoconferencing.

KEY TO SUCCESS: Focus on those areas in your workplace where the Internet could help reduce energy use effectively and efficiently (*e.g.*, videoconferencing) and secure the necessary software and resources to implement the Internet-based changes.

8. Implement Comprehensive Facility Energy And Environmental Management

To maximize the energy savings and its overall benefits to your company, implement a comprehensive facility energy and environmental-management program that addresses all seven of the previously listed steps in an integrated fashion. You can accomplish this by doing it internally, outsourcing it or by combining internal and external resources.

KEY TO SUCCESS: Keep score on your energy use, emission and waste. Establish a commitment from the CEO or COO to develop a corporate energy plan. Designate an overall energy czar who will have responsibility for comprehensive energy improvements and will set specific targets to achieve your efficiency goals.

Pfizer Inc.

The Pfizer Global Research facility, located in Groton, Conn., has a campus of about 20 buildings encompassing more than 4-million square feet. The facility is mainly laboratory spaces used for pharmaceutical research, but includes offices and a cafeteria. Pfizer sought to reduce operating costs, replace failed and antiquated equipment, and reduce campus-wide cooling loads. The company needed to implement energy-system improvements without distracting its own staff from the company's core business.

To achieve these goals, Pfizer entered into a performance contract with Johnson Controls, Inc. This energy-service company designed a comprehensive upgrade, including identifying viable efficiency opportunities and operations and maintenance savings. Johnson Controls also guaranteed the energy savings from these upgrades would pay for the projects. This outsourcing arrangement includes turnkey operations, such as providing construction management, economic analyses, project design, implementation, employee training and savings verification.

Through this approach, Johnson Controls has already identified more than \$1.1 million in annual justifiable energy savings, without sacrificing environmental comfort, quality or safety. More than \$8.8 million in energy efficiency retrofits have been approved, many of which already have been installed. The projected energy savings to Pfizer from the approved upgrades are \$1,183,000 per year.



Resources To Help Make Your Facilities More Energy Efficient

Many resources are available to help manufacturers increase energy efficiency. A few are listed below.

For the complete, online version of this toolkit, visit The Manufacturing Institute Web site at www.nam.org/institute.

General Resources

Leonardo Academy

www.leonardoacademy.org/efficiencyresources/industry.htm

Phone: (608) 280-0255

Fax: (608) 255-7202

This non-profit organization will help you find the information and tools you need to increase the energy efficiency of your facility.

NAM Manufacturing Improvement Center (MIC)

www.nam-mic.com

Phone: (1-800) 969-6205

Operated in conjunction with Concurrent Technologies Corporation, the MIC provides technical services, including ISO 9000 and 14000 preparations; process development; and environmental engineering and management. Call to receive a confidential, no-obligation assessment.

The Manufacturing Extension Partnership (MEP)

www.mep.nist.gov/

Phone: (1-800) MEP-4MFG

This nationwide network of not-for-profit centers in more than 400 locations advises small and medium manufacturers on energy efficiency, providing links to local resources and expertise.

U.S. Department of Energy (DOE), Office of Industrial Technology

www.doe.gov/eere/oit/

DOE has many programs and resources on energy efficiency improvement.

Edison Electric Institute

www.eei.org/esg/other/solutions/

The institute's Web pages contain recommendations for building and equipment efficiency.

Outsourcing Efficiency Improvements

If you want to outsource your project from beginning to end, consider using an energy-savings performance contractor who is willing to develop, implement and guarantee the performance of energy efficiency improvement projects. Many equipment manufacturers, utilities, engineering firms and other companies have formed units that provide these services.

Energy Services Coalition (ESC)

www.wrcperform.org

The coalition is comprised of representatives of energy-service companies (ESCOs), facility owners, finance companies and state energy offices. Its Web site includes a guide to using energy-service companies and a listing of ESCOs serving each state.

National Association of Energy Service Companies (NAESCO)

www.naesco.org

NAESCO promotes the delivery of energy efficiency and other energy services by ESCOs.

Specific Resources

1. To increase the efficiency of all motors and motor-driven systems:

U.S. Department of Energy's Office of Industrial Technologies (OIT)

www.oit.doe.gov/bestpractices

www.oit.doe.gov/bestpractices/software_databases/software.shtml

The OIT will work with you to improve your systems — motors, steam, compressed air, combined heat and power, process heat — plantwide. You can also obtain free, readily available software, such as the U.S. DOE's MotorMaster, to track your motor-driven systems. Use the software to pick the most efficient equipment available within your cost range.

- **MotorMaster+3.0 (MM+3.0)**
An energy efficient motor-selection and management tool, this software includes a catalog of more than 20,000 AC motors and features motor inventory-management tools, maintenance-log tracking, efficiency analysis, savings evaluation, energy accounting and environmental reporting capabilities.
- **Pump System Assessment Tool (PSAT)**
The Pump System Assessment Tool helps assess the efficiency of pumping-system operations. PSAT uses achievable pump-performance data from Hydraulic Institute standards and motor performance data from the MM+3.0 database to calculate potential energy and associated cost savings.
- **Decision Tools for Industry CD**
The Decision Tools for Industry CD contains both the MM+3.0 and PSAT software packages. In addition, it includes MM+3.0 training that walks you through the funda-

mentals and the advanced features of the program, providing examples for using the software to make motor purchasing decisions.

The CD can be ordered on the OIT Web site, via e-mail, Clearinghouse@ee.doe.gov, or by calling (1-800) 862-2086.

Electric Power Research Institute (EPRI)
www.epri-peac.com/asdmaster

ASDMaster: Adjustable Speed Drive Evaluation (Methodology and Application Software)

This Windows software program helps determine the economic feasibility of an ASD application, predict how much electrical energy may be saved by using an ASD and search a database of standard drives. The package includes two diskettes, a user's manual, and a user's guide.

The Industrial Center
www.industrialcenter.org

This non-profit promotes the use of new gas-fueled technologies that increase manufacturing productivity and competitiveness. It's based on the establishment of a market-driven consortia of energy companies, equipment vendors and industrial end-users that finance technology demonstrations and produce market-entry support materials.

2. To upgrade lighting systems:

International Association for Energy Efficient Lighting
www.iaeel.org

An information resource for high-quality, energy-efficient lighting. Access all issues of *IAEEL Newsletter*, visit the Lighting Crossroads resource index and check out Lighting and Energy Meetings & Events.

**U.S. EPA Energy Star Buildings
And Green Lights Partnerships**
www.epa.gov/buildings/esbhome/

Energy Star BuildingsSM is a voluntary partnership between companies and the U.S. Environmental Protection Agency (EPA) to promote energy efficiency in buildings.

Energy Star Labeled Products
www.energystar.gov/products
Phone: (1-800) STAR-YES

This Web site includes product lists for lighting and store locators.

Lighting Research Center
www.lrc.rpi.edu

The center maintains the National Lighting Product Information Program (NLPPI), a source of manufacturer-specific performance information on efficient lighting products.

**3. To upgrade heating,
ventilating, cooling systems and
improve your building shell:**

**U.S. EPA Energy Star
Labeled Products**
www.energystar.gov/products
Phone: (1-800) STAR-YES

This site includes product lists and store locations.

U.S. Department of Energy (DOE)
www.oit.doe.gov/bestpractices/software_databases/software.shtml

BestPractices, an initiative of the Department of Energy's Office of Industrial Technologies, offers software tools to improve your plant's energy efficiency, enhance its environmental performance, and increase its productivity. One free product, 3E Plus, helps determine whether boiler systems can be optimized through the insulation of boiler steam lines. (3E Plus is also available directly from NAIMA; at right.)

**Office of Building, State
And Community Programs**
www.eren.doe.gov/buildings/tools_directory/

Describes 202 energy-related software tools for buildings, with an emphasis on using renewable energy and achieving energy efficiency in buildings.

**North American Insulation
Manufacturers Association (NAIMA)**
www.naima.org
Phone: (703) 684-0084

NAIMA developed 3E Plus, software that calculates how much money can be saved and greenhouse gas prevented by insulating pipes, boilers, storage vessels and ducts. The calculations are based on energy, labor and insulation costs. Many insulation upgrades can have paybacks in less than one year. The 3E Plus program can be used by your own plant manager or by a certified appraiser.

For a list of certified appraisers:
www.insulation.org

To download the free 3E Plus program:
www.pipeinsulation.org

Efficient Windows Collaborative (EWC)
www.efficientwindows.org

Provides information on the benefits of energy efficient windows, descriptions of how they work, and recommendations for their selection and use. Developed with the support of the U.S. Department of Energy's Windows and Glazings Program and the participation of industry members.

American Gas Cooling Center (AGCC)
www.agcc.org

Develops natural gas air conditioning, refrigeration and dehumidification markets. Their site includes information on products, education and events.

4. To capture benefits of utility competition:

- Use energy and utility bill tracking software to track your company's energy consumption and savings. There are a number of commercial software products available. (Visit the Leonardo Academy Web site for a current list of providers: www.leonardoacademy.org/efficiencyresources/energytracking.htm.)
- Competitively procure your energy requirements; ESCOs can help you with this, as can private energy procurement companies, such as American PowerNet (www.americanpowernet.com) or UtiCorp Energy Management (www.uemenergy.com).
- Build energy efficiency into your strategy for reducing utility costs and uncertainty of supply. Energy service companies can also help you with this process.

5. To communicate your company's energy efficiency and environmental achievements to your customers:

Certification Programs

The Cleaner and GreenerSM Certification Program.

www.cleanerandgreener.org
Phone: (1-608) 280-0256

Whole company certification that helps businesses communicate their energy efficiency and environmental achievements to their customers.

ISO Easy

www.isoeasy.org

ISO Online

www.iso.ch

These organizations provide guidance for ISO certification.

• ISO 9000

ISO 9000 standards are management-system standards developed by the International Organization for Standardization (ISO) that state requirements for what an organization must do to manage the processes influencing quality. The standardized definition of "quality" in ISO 9000 addresses all those features of a product (or service) that are required by the customer. "Quality management" in ISO 9000 is defined by the management processes companies have in place to ensure that its products conform to the customer's requirements.

• ISO 14000

Like ISO 9000, ISO 14000 is a set of management-system standards developed by the ISO that state requirements for what an organization must do to manage the processes influencing the impact of the organization's activities on the environment. "Environmental management" in ISO 14000 is defined by the management processes organizations have in place to minimize harmful effects on the environment caused by its activities.

Recognition Programs

U.S. EPA Energy Star

www.energystar.gov
Phone: (1-800) STAR-YES

In return for committing to upgrade their buildings to become more energy efficient, Energy Star BuildingsSM Partners receive access to services, information, tools and resources from the EPA. Visit www.epa.gov/buildings/esbhome/benefits/benefits.html to see how these partnership benefits add even more value to energy-efficiency improvements.

The Manufacturing Institute

www.nam.org/institute

E-mail: mfg.inst@nam.org

Contact the institute for information and resources on planning an Earth Day program at your plant, to show how your company is improving the air, water and land.

Climate Wise

www.epa.gov/climatewise

An EPA and DOE recognition program for industry.

Climate Challenge

www.eren.doe.gov/climatechallenge

A DOE recognition program for utilities.

6. To implement water use reduction equipment and practices:

WATERGY

www.eren.doe.gov/buildings/tools_directory/software/watergy.htm

A simple spreadsheet model that screens sites for potential water conservation opportunities and illustrates the energy savings that result from water conservation activities. Reducing water use decreases the energy needed to pump water from its source. Reducing hot water use reduces the energy needed for heating water.

7. To explore energy savings through increased Internet use:

Metro Atlanta Telecommuting Advisory Council (MATAAC)

www.matac.org/rocket.htm

Lists eight techniques for companies to use in developing successful telecommuting programs.

Telework

Oregon Office of Energy,

Telework Resources

625 Marion Street, NE

Salem, OR 97310

Phone: (503) 378-4040

Fax: (503) 373-7806

A complete guide for setting up a telecommuting program at your business.

8. To implement comprehensive facility energy and environmental management:

For information on how to implement comprehensive facility energy and environmental management, consult the information resources listed above for general information, outsourcing and for each of the eight specific areas of action.

The U.S. Green Buildings Council

www.usgbc.org/

The council is a non-profit organization that encourages the design and construction of environmentally friendly and energy efficient buildings. Members have access to a clearing-house of emerging trends, policies and products. The council sponsors the LEED Green Building Rating System™, a voluntary, consensus-based, market-driven building rating system based on existing, proven technology. A number of resources are available on the Web site, including LEED Green Building Rating System™ software.