

# Energy Matters

U.S. Department of Energy, Industrial Technologies Program



## Features

### 3M Company Hosts *Save Energy Now* LEADER Showcase, Promotes Launch of *Save Energy Now* Corporate-Wide

On October 21–22, 2010, the 3M Company—in partnership with the U.S. Department of Energy’s Industrial Technologies Program (ITP)—hosted the *Save Energy Now* LEADER Showcase, “Launching and Implementing *Save Energy Now* Corporate-Wide,” at the company’s world headquarters in St. Paul, Minnesota. The goal of the Showcase was to demonstrate how industrial companies can increase their competitiveness by implementing energy efficiency and/or process improvements identified through participation in the LEADER initiative.

More than 100 representatives from U.S. industrial companies, utilities, federal and state government agencies, energy service companies, and academia gathered to learn about the various crosscutting energy efficiency technologies 3M has implemented across its global operations—technologies that event participants may be able to implement in their own facilities to realize similar energy and cost savings. Participants also heard presentations from 3M representatives that ranged from overviews of the company’s corporate energy policy to specific measures implemented in individual facilities. For instance, 3M Corporate Energy Manager Steve Schultz provided information on how to implement key energy efficiency projects, how to replicate those projects in various locations, and how to provide motivation and recognition for employee efforts. Additionally, Energy Champions from several 3M plants (Hutchinson, Minnesota; Knoxville, Iowa; and Cottage Grove, Minnesota) highlighted energy efficiency activities implemented in their facilities.

Further, representatives from 3M and fellow LEADER Companies Alcoa, Briggs & Stratton, General Motors, Sherwin-Williams, and JR Simplot participated in a panel discussion to share *Save Energy Now* best practices. Panel members also provided advice to potential LEADER Companies in attendance about launching *Save Energy Now* corporate-wide, addressing how energy champions at their companies were able to make the business case for joining the program to senior management.

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Attendees commended the energy efficiency examples provided during the Showcase; most were particularly impressed with the way the information was presented. “Reading case studies and fact sheets is one thing—they give good information and you can get a lot out of them, but you don’t get the ‘human element’ from that information,” said one attendee. “Sitting here and listening to someone talk about how energy efficiency has provided return on investment—hearing their passion about the subject and their enthusiasm about the subject matter—really motivates you to take what you’ve learned and put it into action in your own plant.”

While attendees praised the information provided by speakers and panel members, many found that the informal breakout sessions—including a networking breakfast and lunch, as well as discussions during breaks—also provided useful information. During these sessions, participants were able to talk with people from other companies about different—and, in some cases, revolutionary—industrial energy efficiency strategies. These peer-to-peer sessions allowed attendees to brainstorm with other like-minded people, and that brainstorming may have provided some of the most useful information of the event.

Showcase participants were also given the chance to see energy efficiency measures in action. Attendees toured 3M’s Innovation Center, visited the campus’s utility plant, and attended an “Energy Fair” that provided information on ways to reduce energy consumption in homes and businesses.

Finally, with several representatives from the Minnesota State Energy Office and regional utilities on hand, the dialogue between presenters and attendees was able to produce meaningful opportunities for industrial companies. One representative from the State Energy Office said that the presentations and conversations allowed him to learn what energy efficiency

### 3M Results to Date

3M set a corporate goal to improve global energy efficiency 20% by 2010, with 2005 as the base year.

Identified nearly 2,000 projects, of which 1,100 were implemented, providing \$68 million in first year savings

Cut worldwide energy use indexed to net sales 25% between 2005 and 2010

Energy teams at 3M facilities are working to achieve a further reduction of 15% by 2015.

measures plants were interested in implementing, and he could then use that information to work with the State Energy Office and utilities to provide rebates for those specific types of projects.

Altogether, the 3M Showcase was a huge success—it provided a forum for the industrial community to share best practices, afforded the opportunity for networking and peer-to-peer interaction, and opened the door for new opportunities and partnerships. Recognizing the value of ITP’s *Save Energy Now* program and its LEADER Showcases, U.S. Congresswoman Betty McCollum (D-Minnesota), who provided opening remarks at the event, stated, “In the U.S. industrial sector alone, energy efficiency measures have the potential to reduce the growth of U.S. energy demand by more than 20% in the next decade ... The *Save Energy Now* program offers a model public-private partnership to ensure we can and will meet that potential.”

More information and event presentations can be found on the Showcase’s website at <http://3mdoesshowcase.govtools.us/>.



# Compressed Air Challenge: Training and Resources Designed with You in Mind



For the typical industrial manufacturer, compressed air is one of the most important utility requirements, but is commonly the most misunderstood energy system. Optimization of compressed air systems is key to greater productivity, efficiency, and profitability. The Compressed Air Challenge® (CAC), in partnership with the U.S. Department of Energy (DOE) Industrial Technologies Program, has developed a rich portfolio of useful compressed air-related information resources, tools, and training seminars—all available with a few clicks of your mouse.

## About Compressed Air Challenge

CAC is a voluntary collaboration of industrial users—manufacturers, distributors, and their associations; consultants; state research and development agencies; energy efficiency organizations; and utilities. These stakeholders work together to execute CAC's mission: to provide resources that educate industry about optimizing compressed air systems, thereby increasing net profits. CAC has trained more than 12,000 compressed air users since 1999.

CAC has one purpose in mind—helping you improve the performance of your compressed air system. In the United States, compressed air systems account for \$1.5 billion per year in energy costs. Optimization of compressed air systems can provide typical energy efficiency improvements averaging between 20% and 50%, pushing as high as 80% in some cases.

## Additional Benefits

In today's industrial settings, approximately 90% of companies use compressed air in some part of their operations. Of this percentage of users, approximately two-thirds have some type of problem with their systems—obvious or not. Some of these problems result from installing the wrong type of compressor, improper cleanup equipment, inappropriate control methods, or unsound installation practices. The bottom line: these problems are very costly in the long run. These hidden costs can be seen

in reduced equipment life and advanced operating costs. These are all symptoms of a much larger problem—a general lack of understanding of compressed air systems. However, there is no such thing as a foolproof compressed air system—even the best systems have the potential for serious problems.

## Training: Solve Problems and Save Energy

To help users understand their system problems and what to do about them, CAC has developed two levels of training for plant engineers: Fundamentals of Compressed Air Systems and Advanced Management of Compressed Air Systems. Last year, CAC launched [Fundamentals of Compressed Air Systems WE \(Web-edition\)](#). This Web-based version of the popular Fundamentals of Compressed Air Systems training uses an interactive format that enables the instructor to diagram examples, give pop quizzes, and answer students' questions in real time, and is delivered on a platform that eliminates travel costs for attendees. To date, CAC has held four highly rated sessions with four more scheduled in 2011. [CAC's Training Calendar](#) and [ITP's BestPractices Training Calendar](#) provide online registration links for all WE sessions, as well as other in-person sessions across the country.

## Hosting Opportunities

Many organizations have found hosting CAC seminars as an excellent way to enhance local knowledge of compressed air system best practices, providing a catalyst for positive change. CAC seminars are designed to be self-supporting. However, pre-trained seminar leaders and course workbooks are made available simply by contacting [info@compressedairchallenge.org](mailto:info@compressedairchallenge.org). All you need to provide is the meeting space, audio visual equipment, and attendees. Whether you are employed by an energy organization or a local manufacturer, CAC is available to assist you in setting up your seminar by providing you with a hosting kit. DOE funding is available for qualified organizations to help mitigate the costs of trainers and workbook materials.

## Compressed Air System Best Practices Manual

In 2009, CAC released [Best Practices for Compressed Air Systems Second Edition](#), an updated edition of the highly successful 2003 manual. The Best Practices Manual was developed to provide readers with the tools necessary to reduce operating costs associated with the use of compressed air and to improve the reliability of the entire system. This one-source manual addresses all of the improvement opportunities associated with compressed air systems—from end-users to the air entering the compressor inlet filter. The Best Practices Manual provides how-to information that will help users implement recommendations that achieve peak performance and system reliability at the lowest operating cost. The Best Practices Manual is a free benefit of attending our Fundamentals seminars. Additional copies are available for purchase at the [CAC Bookstore](#).

## Free Informational Resources

In addition to the Best Practices Manual, CAC offers a comprehensive set of informational resource materials, such as [Guidelines for Selecting a Compressed Air System Service Provider](#) and [Improving Compressed Air System Performance: A Sourcebook for Industry](#).

Other links to compressed air tools include

- [AIRMaster+](#): A DOE software tool designed to help you maximize the efficiency and performance of your compressed air system through improved operations and maintenance practices
- [Log-Tool](#): An import tool that significantly enhances the usability of AIRMaster+.

Additionally, CAC's [Online Library](#) is home to a wealth of other resources, including fact sheets, tip sheets, case studies, and articles on a variety of compressed air-related topics.

## Sponsorship Opportunities

CAC sponsorship has always been open to interested, qualifying organizations (subject to approval by the CAC Board). However, starting in 2011, there is an additional option for energy-related magazines, online magazines, associations, public entities, energy efficiency program administrators, and utilities to become “affiliate” members. Affiliate members will receive the following benefits: discounts on training, a newsletter, and a listing on CAC's website. Affiliates are also permitted to display the CAC affiliate logo on their websites.

If you are interested in learning more about becoming a sponsor or affiliate, or would like to speak to someone about CAC training opportunities and educational resources, please e-mail [info@compressedairchallenge.org](mailto:info@compressedairchallenge.org).

## Success in Industry

# Three-Tiered Energy Audit Program Saves Company \$4 Million in Energy Costs

At Ingersoll Rand, the drive to provide safe, comfortable, and efficient products and services does not end with customers—those same standards are being upheld throughout the company's operations. In 2009, Ingersoll Rand made improving the energy efficiency of its global operations a top priority when it joined the U.S. Department of Energy Industrial Technologies Program *Save Energy Now* LEADER initiative. This commitment is a cornerstone of Ingersoll Rand's efforts to reduce its global energy intensity 25% by 2019. At the center of the company's energy strategy lays a three-tiered energy audit

“We've developed a philosophy in our company around energy efficiency, comfort, and safety that we implement internally and bring to our customers worldwide.”

- Steve Rennie,

*Ingersoll Rand Vice President of Integration*

program that helps reduce energy use and operating costs at many of its largest manufacturing facilities. The program relies heavily on employee volunteers with energy and engineering expertise to join an Expanded Energy Audit team two to three times a year. These teams participate in assessments that not only provide the chance to identify opportunities for improvement, but also educate plant staff about the American National Standards Institute (ANSI) Management System for Energy (MSE) 2000:2008 standard and new energy efficient technologies.

Ingersoll Rand's three-tiered energy audit program consists of the following three elements:

- **Level 1: Treasure Hunt** – Level 1 audits focus on the evaluation of low-cost measures, energy management behavior, and easy-to-implement projects.
- **Level 2: Expanded Energy Audit** – Level 2 audits include three-day visits at high-priority sites and focus on energy using equipment and processes.
- **Level 3: System-Specific Audit** – Level 3 audits focus on compressed air or heating, ventilating, and air conditioning systems.



Through this approach to energy management, Ingersoll Rand has conducted a number of Level 1, 2, and 3 audits at several of its facilities, and the company has implemented many projects that have generated substantial energy savings. Altogether, the company has saved more than \$4 million in energy costs globally since the inception of its auditing efforts in 2005.

A combination of strong corporate leadership, cross-facility collaboration, and a dedicated staff willing to work off an initial concept has led Ingersoll Rand to achieve great success with its energy efficiency efforts. For more information about the company's three-tiered energy audit model, read the [Ingersoll Rand Success Story](#).

## Brown Printing Company: Using Its Environment to Save Energy

**B**rown Printing Company, headquartered in Waseca, Minnesota, features a 775,000-square-foot facility that prints approximately 200 weekly, bi-weekly, and monthly special interest publications, consumer publications, business-to-business publications, catalogs, and inserts for its national clientele. New to the U.S. Department of Energy Industrial Technologies Program *Save Energy Now* LEADER initiative, Brown Printing Company recently committed to reducing its facilities' energy intensity 25% over the next 10 years.

Although only recently committing to the program, Brown Printing Company's dedication to efficiency and conservation has been in place for several years. In 2008, Brown Printing Company received the Efficiency Partner Award from Xcel Energy for outstanding efforts in energy conservation. The award was presented after the Waseca facility achieved savings of 4.24 million kilowatt hours (kWh) through the course of the 2008 program. In 2010, Brown Printing Company was recognized as the CenterPoint Energy Customer of the Year for the company's

long-term dedication to energy efficiency in its business model.

One method the company's Waseca site is currently using to reduce its energy use takes advantage of its location—one hour south of Minneapolis—utilizing the cold weather to aid in the plant's processes. During the harsh Minnesota winters, the chiller units on all of the company's presses run on a "free" cooling chiller. In cold months, water is pumped to the roof—instead of a refrigeration unit—where it is cooled naturally. These systems save more than 2.4 million kWh per year, equivalent to the amount of energy used to power 225 homes.

Each of Brown Printing Company's three facilities have implemented this free cooling method along with numerous other initiatives, including energy efficient lighting installation, variable frequency drives, computerized building management systems, and motion sensor lighting installation. With so many progressive steps being taken at each of Brown Printing Company's facilities, the company received a 2010 Environmental Innovation Award

from Unisource Worldwide, Inc. and WhatTheyThink for making real and concrete contributions to innovation, implementation, and communication of environmental solutions.

Brown Printing Company's new pledge to join the *Save Energy Now* LEADER initiative marks another step toward meeting the company's efficiency goals.

For more information about the company's energy efficiency efforts, visit <http://www.bpc.com/environment>.



## New Belgium Brewing Company: Alternatively Powered

New Belgium Brewing is an employee-owned regional craft brewery located in Fort Collins, Colorado. In July 2010, New Belgium became 1 of 13 companies to make a voluntary commitment to improve the energy efficiency of its manufacturing facilities through participation in the Colorado Industrial Challenge (the Challenge)—a program co-sponsored by the Colorado Governor's Energy Office and the U.S. Department of Energy.

As part of the Challenge, the brewery will receive technical assistance from Colorado State University's Industrial Assessment Center and the ETC Group, an environmental engineering firm, to continue the energy efficiency efforts the company already has underway through the use of its Sustainability Management System—a system that requires the company to establish its current environmental impact, set specific targets for improvement, make plans to achieve those targets, and keep the plan/do/check/act cycle rolling.

As a company founded with sustainability in mind, New Belgium has already taken great strides to reduce its energy intensity and carbon footprint. In fact, one year the company's employees unanimously voted to forgo holiday bonuses and instead invest the money into wind-powered energy, proving their commitment to social and environmental responsibility.

Some of the company's main efforts to reduce energy use involve increased efficiencies in the brewing process and onsite energy production. New Belgium's brew kettle was only the second of its kind installed in North America and is considered more efficient than standard brew kettles because it heats thin sheets of wort—the liquid extracted from the mashing process during the brewing of beer—rather than the whole kettle at once. Additionally, the brewery uses the methane produced by process water treatment to fuel a combined heat and power engine—or co-gen—which creates electricity and heat for the brewery.

To learn more about New Belgium's environmental stewardship, visit [http://www.newbelgium.com/culture/alternatively\\_empowered.aspx](http://www.newbelgium.com/culture/alternatively_empowered.aspx).



# DOE Grant Funds R&D Project to Improve the Efficiency and Productivity of Plastics Production

Recently, the U.S. Department of Energy's Industrial Technologies Program (ITP) awarded Guided Wave Inc. of Rancho Cordova, California, with a \$250,000 grant as part of the Industrial Energy Efficiency Grand Challenge—a funding opportunity announcement to support the development of transformational industrial processes and technologies that can significantly reduce the energy intensity and/or greenhouse gas emissions of U.S. industry. Guided Wave specializes in online optical measurements for process analytical chemistry and has served the polymer, chemistry, petroleum, pharmaceutical, sterilization, and semiconductor industries for more than 20 years.

The ITP grant will be assisting the company's efforts in developing a new technology to monitor the color of polymers—a key ingredient in plastic manufacturing—during the high-heat, high-pressure extrusion process. Currently, if polymers are the wrong color, they are often recycled back through the extrusion process. Although this does save the material, the redundancy of the process uses extra energy and increases carbon emissions.

The new device under development is meant to withstand the high heat and pressure inside an extruder. Being able to monitor coloring in this early stage of production will ensure the target color is reached without the need for an energy intensive and wasteful repetition of the process.



Aside from the engineering challenges created by the high temperatures, high pressure, and low-light conditions involved in the polymer color process, Guided Wave says that high development costs is what has kept technology from advancing. ITP's grant made Guided Wave's research and development project possible, helping the company offer industry an energy saving advancement in a cost-effective way.

Guided Wave's technology will enhance the production of an array of products—from detergent containers to plastic bottles. If developments are successful, the new technology could improve both productivity and energy efficiency in the manufacturing of plastics.

For more information about Guided Wave and the Industrial Energy Efficiency Grand Challenge, visit [http://www.guided-wave.com/\\_pdf/news/PR\\_DOE\\_Award.pdf](http://www.guided-wave.com/_pdf/news/PR_DOE_Award.pdf).



## States &amp; Utilities Corner

## Sherwin-Williams Partners with Kentucky's Save Energy Now State Project to Facilitate Peer-to-Peer Networking on Industrial Energy Efficiency Topics

On Friday, December 3, 2010, The Sherwin-Williams Company and Kentucky's Pollution Prevention Center (KPPC) co-hosted the "Kentucky Energy Alliance Facility Tour and Roundtable." As part of Kentucky's Energy Alliance (KEA), the meeting brought 45 representatives from industry, health care, academia, and state agencies together at Sherwin-Williams' Richmond manufacturing plant to share energy management best practices. During the meeting, attendees were provided the opportunity to converse with peers and discuss what their companies have been doing to improve energy efficiency.

KEA is facilitating local networking between industrial and large commercial facilities that want to share information about energy efficiency resources. KPPC, based at the University of Louisville J.B. Speed School of Engineering, is leading Kentucky's *Save Energy Now* program, providing resources and expertise to help deliver cost-saving energy efficiency solutions to industry, and supporting efforts to bolster KEA. Kentucky's *Save Energy Now* program is being funded through a three-year project award from the U.S. Department of Energy's Industrial Technologies Program (ITP). As part of the program, KPPC developed its own state-level "pledge" for businesses, industries, and other organizations to reduce their energy consumption by 2.5% annually for 10 years. During the December event, KPPC described the various resources companies could utilize by participating in the statewide pledge program, including

- Assistance with developing energy baselines and energy management plans
- Access to energy assessments, training opportunities, and an energy management expert
- Access to proven energy analysis software tools and other DOE technical resources
- Statewide recognition for pledge participation and reported energy savings achievements.

Kentucky companies that take the pledge work toward achieving "five stars:"

1. Sign the pledge and develop an energy use baseline
2. Institute an energy management policy, establish a cross-functional energy team, and attend energy management training
3. Assess operations for potential improvement opportunities and develop an energy action plan to reduce energy use by at least 2.5% each year
4. Implement the energy action plan and evaluate progress of the energy management program
5. Develop an internal recognition program and mentor other pledge participants.

Having Sherwin-Williams host the event seemed fitting. Not only was Sherwin-Williams the first company to sign Kentucky's pledge, but it was also the first to achieve all "five stars." Furthermore, the company's Engineering, Maintenance, & Safety Manager, Gary Satler, has been actively recruiting other companies to participate in the program. As of January 2011, 20 companies have joined the state's pledge program.

In addition to the sharing of best practices, the December event also featured a tour of Sherwin-Williams' plant and its utilities—the cooling tower and boiler room. Several Sherwin-Williams employees showcased energy efficiency projects that were implemented as a result of the company's employee suggestion system. For example, one employee-suggested project involved the installation of variable speed drive fans in the plant's cooling tower.

Additionally, at several locations throughout the plant, Sherwin-Williams employees can find suggestion boxes where they can provide opinions and ideas. Each week, suggestions are reviewed and assigned to an "action manager" for follow-up. Employee suggestion topics have ranged from continuous improvement, cost savings, safety, recycling, lean operations, to energy. At the

end of every year, the best ideas are selected for a cash award that amounts to a percentage of the implemented project's resulting one-year savings. To date, Sherwin-Williams has experienced great success with its employee suggestion system. In its first year participating in ITP's *Save Energy Now* LEADER initiative and Kentucky's state pledge program, energy efficiency improvements at the company's Richmond plant have reduced the site's energy consumption by 26%.

Working together, the State of Kentucky and locally-based industries are improving their energy efficiency and economic competitiveness through peer-to-peer networking and the sharing of energy management best practices, program activities, and education.

For more information about Kentucky and other U.S. state activities, visit [http://www1.eere.energy.gov/industry/states/state\\_activities/main\\_map.asp](http://www1.eere.energy.gov/industry/states/state_activities/main_map.asp).

For more information about KPPC, visit <https://louisville.edu/kppc/>.



Boiler room at the Sherwin-Williams Richmond, Kentucky, manufacturing plant.

## Tools of the Trade

# The Energy Management Toolkit

The U.S. Department of Energy's Industrial Technologies Program (ITP) is currently in the process of developing the Energy Management Toolkit. The forthcoming toolkit is a free integrated tool suite with two major components—technology solutions and an energy management portfolio. The technology solutions portion of the toolkit will comprise the plant-wide and system-specific software tools that are currently offered by ITP to help energy managers assess energy use and identify savings opportunities within their facilities. From the Quick Plant Energy Profiler to MotorMaster+, all of the tools needed to improve energy management at industrial facilities will now be available in one central location.

New to ITP's software repository, the toolkit will feature the Energy Management System Implementation Self-Paced Module, a baseline energy management plan to help energy managers set

timelines and develop strategies for meeting energy efficiency goals in their facilities. Because the tool is self-paced, it can be easily adapted to the needs and energy reduction goals of any user's facility. Additionally, the energy management tool also provides plant managers with tips to help get employees engaged in efficiency measures, as well as pointers to assist in overcoming other roadblocks along the way to implementation.

The Energy Management Toolkit is scheduled for release in late April 2011. More information on the toolkit will be available in the spring issue of *Energy Matters*.

Please visit <http://www1.eere.energy.gov/industry/bestpractices/software.html> for more information about ITP's software tool offerings.

## Research & Development

# Aerogel: Material of the Future Begins to Reach Its Commercial Potential

Aerogel is a lightweight, microporous material that has been around since the late 1920s. Recognized as having the highest insulation value of any known material, aerogel is also acknowledged for its ability to withstand extreme environments, decrease installation costs, reduce hazardous emissions, and reduce energy losses. However, even with these noted benefits, it wasn't until recently that the material began to reach its commercial potential.

The original production of aerogel—a supercritical drying method—though effective, was also dangerous, time-consuming, and expensive. Despite many companies' research efforts, these factors led to the discontinued production and focus on aerogel in the 1970s. It wasn't until the 1990s that researchers discovered safer, more efficient, and cost-effective manufacturing methods, allowing multiple industries to take advantage of the material's unique characteristics. Today, there are two main approaches to making aerogel. First is a surface modification technique—a patented approach owned by materials company Cabot Corporation—that allows for subcritical liquid evaporation without significant gel shrinkage.<sup>1</sup> The other method—developed by insulation manufacturer Aspen Aerogels—involves casting silica gel onto a fibrous batting and then supercritically drying the resulting blanket.<sup>2</sup> Cabot Corporation and Aspen Aerogels are the only two companies to manufacture the product commercially.

Today, there are a variety of applications for which aerogels are used. However, due to high manufacturing costs, aerogel has been primarily used in high-end industrial insulation applications in the oil, gas, and chemical industries. For instance, some of Aspen Aerogels' first commercial contracts were to provide aerogel insulation for subsea oil transmission pipelines that go deep into the ocean.<sup>3</sup>

In order for aerogels to work in the high- and low-temperature environments required in industrial steam, fuel transport, and cold insulation applications, new formulations of the standard aerogel material had to be developed. In 2006, the U.S. Department of Energy's Industrial Technologies Program (ITP) awarded Aspen Aerogels a research and development grant to develop an aerogel-based thermal insulation system for application to industrial steam distribution systems, including pipes, valves,

traps, and other line components. With ITP assistance, Aspen Aerogels developed its Cryogel and Pyrogel aerogel systems for cold (-460°F) and hot (1200°F) insulation applications, respectively. Low-temperature applications include cryogenic air separation, liquefied natural gas storage, chilled water pipes, and petrochemical processing, while high-temperature applications include refineries, gas processing, and power plants.

Aerogel-based pipe insulation performs a similar function as traditional steam pipe insulation systems, which employ mineral wool, fiberglass, calcium silicate, perlite, or various foams. However, as a flexible blanket material with intrinsic hydrophobicity, aerogel is not susceptible to the embrittlement or logging that deteriorates traditional materials. Additionally, aerogel significantly reduces the amount of material needed to perform the same thermal function, and can be doped to provide durable water repellency, mitigating one of the primary modes by which insulation degrades and energy is subsequently lost; this process also helps protect the pipelines from corrosion.

Aerogel insulation has been successfully installed and used in plants around the world, including those of ExxonMobil, Suncor, Valero, and Chevron. ITP estimates that if aerogel insulation was applied to 40% of the 160,000 miles of U.S. industrial steam pipes, annual energy savings of 16 trillion British thermal units and energy cost savings of \$117 million could be achieved by 2025.

While much of the market focus for aerogel has been on high-end industrial applications, the product is beginning to reach a broader potential. Other emerging applications for the industrial and construction markets include

- Structural composite insulation panels for commercial buildings
- Industrial and commercial insulation strips for heat and noise insulation
- Window insulating material for furnaces, kilns, spacecrafts, and commercial and residential buildings
- Shock-absorbing material
- Matting coatings for wear, corrosion, and thermal resistance in industrial applications.

Moreover, the material is now being used in unlikely quarters. For instance, the apparel industry is using aerogel to make insulated clothing for hikers, soldiers, firemen, and astronauts.

Commercial installations of the abovementioned applications include Kalwall installing structural panels in many locations across the United States, Burton Snowboards in Vermont and Corpo Nove in Italy selling aerogel insulated clothing, and the National Aeronautics and Space Administration developing Thermablok® as a spinoff for construction applications. Guardian Industries has also developed an aerogel containing vacuum-insulated glass system for windows, and others have developed glazing systems. Samsung recently partnered with Aspen Aerogels to begin selling the company's insulation products for solar thermal applications.

Other installations include the Rhode Island Housing Authority's use of Aspen Aerogels' Spaceloft® in building retrofits; daylighting panels in Zurich, Switzerland; and Birdair's roofing system at the Dedmon Athletic Center at Radford University in Radford, Virginia.

Future industrial applications currently under development include desalination, high-speed particle detectors, chemical sensors, hydrogen production or storage media, and supercapacitors.

In just a short period of time, the application and commercial viability of aerogel has reached unexpected heights. The material is penetrating new markets that before were considered impractical. We may not know what the next big market for the



material will be, but it is clear from the numerous applications described here that aerogel has the potential to be a material of the future that can significantly impact residential, commercial, and industrial energy use.

#### Endnotes

<sup>1</sup> McCoy, M. (2010, Nov. 22). As Light As Air. *Chemical & Engineering News* 88(47), 18–19.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

## Implementation

# Sherwin-Williams and Alcoa Discuss Strategies to Overcome Internal Barriers to the Implementation of Energy Efficiency Projects

Throughout 2010, the Industrial Technologies Program (ITP) presented two series of webcasts to provide industrial companies with peer-to-peer information regarding energy efficiency and implementation. During one of the ITP webcasts, Gary Satler (Manager of Engineering, Maintenance & Safety at The Sherwin-Williams Company) and Walter

Brockway (Manager of Global Energy Efficiency at Alcoa, Inc.) provided information on the topic “Energy Efficiency Projects: Overcoming Internal Barriers to Implementation.” Each discussed how his respective company was able to surmount different energy and sustainability challenges.

At Sherwin-Williams' Richmond, Kentucky, plant, the major hurdles to energy efficiency project implementation included access to capital, justification of projects, and allocation of staff resources. After implementing electricity projects that positively impacted the company's budget, identifying an opportunity to reduce natural gas use by 25%, and forming a site energy team, the plant was able to consistently access capital for energy projects, justify the implementation of projects through proven results, and focus its high-level engineering and maintenance goals on energy and reliability.

At Alcoa, the biggest obstacles to project implementation were gaining both high-level and low-level management support, creating an effective internal energy organization, raising employee awareness and involvement in energy activities, and obtaining funding for energy efficiency projects. After establishing a global energy efficiency team, Alcoa was able to execute a comprehensive energy efficiency program throughout the company. By holding monthly calls, leveraging internal and

external resources, transferring knowledge amongst internal stakeholders, sharing company best practices, and exploring creative methods to implementing energy projects, the company was able to institute a new discipline and skill set that reduced its costs, energy intensity, and carbon footprint.

While every company will face its own set of unique challenges to project implementation, Mr. Satler and Mr. Brockway addressed many of the internal barriers that all companies face, including securing capital and obtaining corporate buy-in. Through the establishment of energy teams and other strategies, Sherwin-Williams and Alcoa are two companies that have had great success overcoming these barriers.

To access the slides and audio file from the Sherwin-Williams/Alcoa webcast, visit [http://www1.eere.energy.gov/industry/resources/thursday\\_webcasts.html#mgt\\_finance](http://www1.eere.energy.gov/industry/resources/thursday_webcasts.html#mgt_finance).

To access ITP's library of industry webcasts, visit <http://www1.eere.energy.gov/industry/resources/webcasts.html>.

## ITP Case Studies Highlight Industrial Efficiency Leaders; Share Best Practices

The Industrial Technologies Program (ITP) helps U.S. manufacturers improve their energy efficiency through the adoption of state-of-the-art technologies and energy management best practices. ITP offers tools, training, assessments, and many other resources to help industrial companies identify the most cost-effective options for saving energy—regardless of company size or level of energy management expertise.

A number of companies have leveraged their partnership with ITP to identify and implement energy saving measures and, as a result, are experiencing significant annual cost savings, improved production, stronger competitiveness, and increased profitability. To help manufacturers learn from their industrial peers, ITP regularly produces case studies that feature such companies' successful energy efficiency implementation projects and corporate energy management practices.

Case studies provide the information needed to allow personnel from other facilities to analyze and determine whether or not a similar project or approach would be applicable and beneficial to their own plant(s). Case studies typically include the following details:

1. A pre-implementation profile/baseline information on the plant before it incorporated the new technology, process, and/or approach
2. A description of the problem at hand and how it was identified, the company's decision-making process and rationale for addressing the problem, and the steps that were taken to find a solution
3. A detailed account of the technology, process, approach, and/or program implemented
4. An explanation of the benefits realized (e.g., energy and cost savings, payback periods, etc.).

Featured case studies have detailed a multitude of energy management solutions, such as successful employee recognition programs, energy audit models, partnerships with government program offices, approaches to preparing for assessments, and effective corporate leadership practices.

To see what other companies have done to increase their savings, read ITP's most recent case studies:

- [Ingersoll Rand Discovers Hidden Savings with a Three-Tiered Energy Audit Model](#)
- [Harrison Steel Leverages both ENERGY STAR® and Save Energy Now programs to enhance energy efficiency efforts and multiply captured energy savings](#)

Additional case studies can be accessed on ITP's website at

[http://www1.eere.energy.gov/industry/saveenergynow/case\\_studies.html](http://www1.eere.energy.gov/industry/saveenergynow/case_studies.html).

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy
INDUSTRIAL TECHNOLOGIES PROGRAM

**Success Story:  
Harrison Steel**

Harrison Steel leverages both ENERGY STAR® and *Save Energy Now* programs to enhance energy efficiency efforts and multiply captured energy savings

When Harrison Steel Casting Company made the decision to advance its energy efficiency efforts, the company took stock of the resources available to industry and made a strategic decision to partner with both the U.S. Environmental Protection Agency's (EPA) ENERGY STAR® program



Harrison Steel facility where ductile iron is poured into casting molds

reducing energy consumption and the associated costs should examine the results that Harrison Steel has realized by partnering with both the *Save Energy Now* and ENERGY STAR programs.

## Industrial Technologies Program IMPACTS

Industry is the largest and most diverse energy-consuming sector in the U.S. economy. Each year, the Industrial Technologies Program (ITP) conducts research, development, and demonstration (RD&D) projects and technology transfer activities to address some of the nation's biggest challenges in the areas of energy security and environmental performance. ITP tracks energy savings and other benefits associated with the successfully commercialized technologies that result from its research partnerships. This information is published in the Program's IMPACTS Report. The IMPACTS document lists the ITP-sponsored technologies that are commercially available, their applications, and their benefits. It also details the impacts of ITP's technical assistance initiative, *Save Energy Now*.

Over the past 30 years, ITP has supported more than 600 separate RD&D projects that have produced more than 200 commercialized technologies. In 2008 alone, 104 of these successfully commercialized technologies resulted in industry saving 75.0 trillion British thermal units (Tbtu) in energy costs. In addition to impressive energy savings, the industrial sector reaps even greater benefits from these technological advancements, including improved productivity, reduced resource consumption, decreased emissions, and enhanced product quality.

In addition to its RD&D projects, one of ITP's major efforts is the *Save Energy Now* program. Through this national initiative, ITP has developed a robust suite of energy saving tools and services to help industry improve its energy efficiency. The IMPACTS Report details the progress of technical assistance and

implementation derived through *Save Energy Now*. For instance, as of September 2009, more than 1,500 industrial facilities have implemented recommendations identified during ITP-sponsored energy assessments. As a result, these companies have saved \$218 million and 35 Tbtu, and reduced their carbon dioxide emissions by 2.3 million metric tons each year.

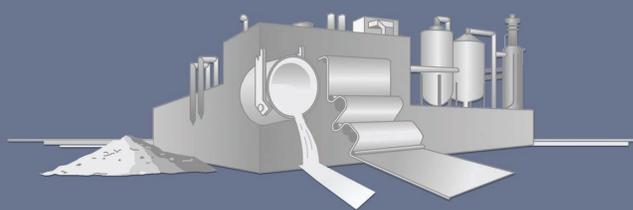
To learn more about the technologies and programs that can help improve your plant's performance, read ITP's [IMPACTS Report](#).

IMPACTS

August 2010

**Industrial Technologies Program:**  
Summary of Program Results for CY 2008

Boosting the Productivity and Competitiveness of U.S. Industry



## Ask the Energy Expert

*Ask the Energy Expert* is an ongoing column with the intent of providing information and solutions for some of industry's most pressing questions. This issue's Energy Expert is Sean West, Environment, Health and Safety Project Manager at United Technologies Corporation.

# UTC's Five-Pronged Approach to Energy Management

*Dear Energy Expert:*

*My company recently issued a corporate directive to reduce our manufacturing facilities' energy intensity. I am in charge of creating an energy management plan to help accomplish this objective. Can you explain what steps your company has taken to develop a successful energy management program?*

United Technologies Corporation (UTC) is a diversified company that delivers high-technology products and services to commercial building and aerospace industries globally. With operations in approximately 180 countries, our business units include Carrier heating and air conditioning, Hamilton Sundstrand aerospace systems and industrial products, Otis elevators and escalators, Pratt & Whitney aircraft engines, Sikorsky helicopters, UTC Fire & Security systems, and UTC Power fuel cells.

Energy management has been at the heart of UTC's corporate culture since the late 1980s. It was during this time that the UTC Energy Council was formed to develop and share energy management best practices among business units. This paved the way for our five-pronged energy management approach, which has continuously improved since the 1990s. The plan consists of five components: a *data collection and management system*, *policies and goals*, an *in-house energy team*, *energy assessments*, and a *project tracking system*. All components are interrelated and, when brought together, form the framework of an energy management program that has enabled us to achieve substantial reductions in both energy intensity and absolute greenhouse gas (GHG) emissions.

### Data Collection and Management System

UTC developed a centralized, Web-based environmental data collection and management system. The implementation of this system is vital to our company's energy management agenda.

The most direct benefits of the system are visibility and consistency. First, when we turn raw data into useful information we can prioritize where we look for energy savings opportunities within our operations. Second, one cannot execute an energy management plan without having data in a consistent format. Having a centralized data system that individual facility managers can access via Web browsers, ensuring that all data is entered in standardized formats, enables UTC to overcome the inherent challenges that come with using spreadsheets. In addition, the accuracy of the data is essential. To improve data accuracy, UTC built error checking and intelligence functions into its system.

On January 26, 2011, UTC hosted the *Save Energy Now LEADER Showcase*, "The Power of Partnerships," at its Hamilton Sundstrand location in Windsor Locks, Connecticut. The Showcase brought together current and potential LEADER Companies, their suppliers, and U.S. Department of Energy representatives. During the event, UTC shared insights gained in meeting the company's sustainability goals and talked about efforts to engage suppliers in establishing their own energy conservation programs. Participants also had the opportunity to tour the plant's manufacturing operations, getting a closer look at the beneficial cost-saving technologies UTC has implemented.

The event was ITP's third *Save Energy Now LEADER Showcase*. The goal of these events is to demonstrate how industrial companies can increase their competitiveness through strategic partnerships and the implementation of energy efficient technologies and processes. Showcases also serve as a forum for industrial stakeholders to engage in peer-to-peer interaction, share energy management best practices, and learn from each others' experiences.

However, because our system has many geographically dispersed users, one challenge we faced involved training requirements. In addition to providing training for system users, UTC also made concerted efforts to automate the system to the highest extent possible. This helps the program run more self-sufficiently and reduces the amount of time spent on data entry. It's important for data collection efforts to complement existing processes. This will further reduce training requirements and save both time and resources by only having to enter data once. By extension, the merging of data systems—such as accounting and environmental systems—is recommended, if possible. Furthermore, it is very important to set realistic boundaries when implementing a data management system. UTC's original data system was first established in the company's largest sites and then incorporated into other smaller sites. Today, the Web-based system collects energy and GHG data for over 300 manufacturing sites around the world and an estimate of energy consumption for thousands of small non-manufacturing sales and service locations.

**“The real success of an energy management program is the implementation of projects.”**

## Policies and Goals

With a system in place to measure and analyze energy use, goals can be set for reduction. The energy reduction goals must be supported by the highest level of management and become company policy. In this manner, energy reduction targets become part of the company's operational goals.

## In-House Energy Team

Knowledge sharing is a central element of UTC's approach to energy management. As such, we created a cross-functional energy team—or an in-house resource of energy experts from different business units—to develop, communicate, and implement energy management best practices throughout the organization. Regardless of your organization's size, an in-house energy team should be structured to accommodate differences among business units and individual manufacturing facilities. By doing so, in-house energy management teams avoid the pitfalls associated with generalizing needs based on organizational structure. In addition, the energy team should be encouraged to propose improvements to a corporate energy management plan, and conversely, corporate decision makers should regard an energy management plan as an evolutionary process that is constantly improving.

## Energy Assessments

UTC's energy management team provided the expertise needed to perform assessments at many of our manufacturing facilities. Normally, assessments are performed by two to four team members over a two-day period. With over 300 manufacturing facilities around the world, it became obvious that the energy team could not complete assessments at all sites. For this reason, UTC developed “The UTC Energy Management Guidebook” for use by onsite managers. The guidebook, which is about 45 pages in length, documents and shares energy management best practices that should be implemented in all facilities, both large and small. The purpose of the guidebook is to set a standard approach for managing energy at all UTC facilities. Topics covered in the guidebook include data management; utility rate reviews; procurement strategies; lighting efficiency; compressed air, boiler, and HVAC systems and controls. The output of the standardized approach is project identification.

## Project Tracking System

UTC enters information about potential efficiency projects into a project tracking module that links to the aforementioned environmental data collection system. Entering information about a potential project allows us to tie it to and compare it against our company's goals. This helps us determine whether the identified project will keep us on track to meet our goals. In addition, the project tracking module is instrumental in giving projects visibility so they can be reviewed by senior management. The real success of an energy management program is the implementation of projects. The project tracking module documents the energy savings for completed projects and maintains a list of projects pending approval.

## Conclusion

At UTC, we pride ourselves on our commitment to performance, innovation, opportunity, responsibility, and results. We strive to maintain the highest environmental standards everywhere we do business. We have a strong history of setting environmental goals and pursuing them by continuously improving our processes at every level of the company. Through our five-pronged energy management approach, as well as our partnerships with other companies and governmental organizations—including the U.S. Department of Energy's Industrial Technologies Program—UTC continues to identify, fund, and implement energy and GHG reduction projects that are generating noteworthy results.

## International

The Alliance to Save Energy is hosting its annual Energy Efficiency Global Forum in Brussels, Belgium, April 12–14, 2011. The event, now in its fourth year, brings together officials from government, industry, and nonprofit organizations to discuss trends and issues in energy efficiency. For more details, visit the [Alliance to Save Energy's website](#).

Commerce Secretary Gary Locke recently launched the Renewable Energy and Energy Efficiency Export (RE&EE) Initiative. The effort, co-chaired by the Department of Commerce and Department of Energy (DOE), brings together eight federal agencies to coordinate efforts and boost exports in renewable energy and energy efficiency industries. The initiative will offer new and more innovative financing mechanisms for companies looking to expand abroad, increase the number of trade promotion events for RE&EE companies, direct agencies to improve export services in RE&EE, and lower trade barriers for RE&EE companies. This initiative will also help the United States meet President Obama's goal of doubling exports by 2015. Visit [www.export.gov/reee](http://www.export.gov/reee) for more information.

In December 2010, Secretary Chu attended the United Nation's annual Convention on Climate Change Conference in Cancun, Mexico. Secretary Chu's speech, "Building a Sustainable Energy Future," covered recent federal investments in clean energy. He touched on a number of topics, including the Obama administration's recent successful effort to raise vehicle

efficiency standards for the nation's automobile fleet, new DOE software tools to improve building efficiency, manufacturing tax credits for clean energy technologies, new appliance standards, and research in biomass energy.

Members of the Industrial Technologies Program (ITP) Steam Systems Best Practices program conducted a recent training workshop in Hyderabad and Pune, India. The three-day event educated local participants in DOE's Steam System Tool Suite, including the Steam System Scoping Tool, the Steam System Assessment Tool, and 3E Plus®. During the workshop, participants practiced identifying steam system improvement opportunities and discussed recommendations with the entire class. Upon completion, participants received DOE certificates.

This May, the United States will host high-level representatives from China for the 2nd U.S.-China Energy Efficiency Forum. The event—which is open to the public—will take place in Berkeley, California, and highlight energy efficiency cooperation and partnerships between the two countries. The first ever meeting took place last year in Beijing, bringing together more than 150 representatives from government, industry, academia, and nonprofit organizations. These meetings are a result of the Joint U.S.-China 10-Year Energy and Environment Cooperation Framework. To learn about the Cooperation Framework, visit <http://www.pi.energy.gov/documents/10YearFramework.pdf>.

## Funding Resources

The Office of Energy Efficiency and Renewable Energy (EERE) works with business, industry, universities, and others to increase the use of renewable energy and energy efficiency technologies. One way EERE encourages the growth of these technologies is by offering financial assistance opportunities for their development and demonstration. Visit the [EERE Financial Opportunities website](#) to learn about the EERE funding and award process, types of EERE financial assistance, and how to apply.

The Industrial Technologies Program (ITP) offers many opportunities and activities for manufacturers who want to reduce their energy use and improve productivity. ITP uses Funding Opportunity Announcements (FOAs) to contract for cost-shared research and development. These opportunities reflect the priorities of the program and selection of projects follows merit-based criteria that emphasize projected energy, environmental, and economic benefits. Visit [ITP's website](#) for active and future opportunities.

## Training Opportunities

### February 28–March 21, 2011

**Fundamentals of Compressed Air (Level 1); Four-Part Series** [Webinar]. This Web-based version of the popular Fundamentals of Compressed Air Systems training uses an interactive format that enables the instructor to diagram examples, give pop quizzes, and answer students' questions in real time. Contact: Training Coordinator; [info@compressedairchallenge.org](mailto:info@compressedairchallenge.org).

### March 2, 2011

**Fundamentals of Compressed Air (Level 1)** [Strattanville, Pennsylvania]. This is a 1-day introductory workshop designed to teach facility engineers, operators, and maintenance staff how to achieve 15%–25% cost savings through more effective production and use of compressed air. Contact: Shelly Luchini; 814-375-4772; [smc200@psu.edu](mailto:smc200@psu.edu).

### March 3, 2011

**Motor Systems Management** [Morgantown, West Virginia]. This 1-day workshop covers motor systems management, including applications, inventory tracking, maintenance, replacement decisions, repair, and the impact and maintenance of power quality. Contact: Kathleen Cullen; 304-293-2867; [Kathleen.cullen@mail.wvu.edu](mailto:Kathleen.cullen@mail.wvu.edu).

### March 8–9, 2011

**Advanced Management of Compressed Air (Level 2)** [Ann Arbor, Michigan]. This intensive 2-day workshop provides in-depth technical information on troubleshooting and making improvements to industrial compressed air systems. Contact: Brian LaFrance; 763-350-9397; [lefrance@umich.edu](mailto:lefrance@umich.edu).

### March 16, 2011

**Pumping Systems Assessment** [Hazleton, Pennsylvania]. This 1-day workshop discusses performance problems encountered in everyday applications and presents the Pump System Assessment Tool (PSAT). Contact: Sally A. McGuire; 570-450-3053; [sam34@psu.edu](mailto:sam34@psu.edu).

### March 18, 2011

**Process Heating Systems Management** [Dayton, Ohio]. This 1-day workshop includes an introduction to process heating and process heating equipment, such as furnaces, ovens, dryers, heaters, kilns, etc. Contact: Ray Lepore; 937-216-9452; [ray.lepore@protogengroup.com](mailto:ray.lepore@protogengroup.com).

### March 22–23, 2011

**Advanced Management of Compressed Air (Level 2)** [Louisville, Kentucky]. This intensive 2-day workshop provides in-depth technical information on troubleshooting and making improvements to industrial compressed air systems. Contact: Lisa Tatum Wease; 502-852-0148; [lisa.tatumwease@louisville.edu](mailto:lisa.tatumwease@louisville.edu).

### April 12–13, 2011

**Advanced Management of Compressed Air (Level 2)** [Louisville, Kentucky]. This intensive 2-day workshop provides in-depth technical information on troubleshooting and making improvements to industrial compressed air systems. Contact: 626-812-7537; [www.sce.com/workshops](http://www.sce.com/workshops).

### April 15, 2011

**Fundamentals of Compressed Air (Level 1)** [Dayton, Ohio]. This is a 1-day introductory workshop designed to teach facility engineers, operators and maintenance staff how to achieve 15%–25% cost savings through more effective production and use of compressed air. Contact: Ray Lepore; 937-216-9452; [ray.lepore@protogengroup.com](mailto:ray.lepore@protogengroup.com).

### April 26, 2011

**Fundamentals of Compressed Air (Level 1)** [Omaha, Nebraska]. This is a 1-day introductory workshop designed to teach facility engineers, operators, and maintenance staff how to achieve 15%–25% cost savings through more effective production and use of compressed air. Contact: Dennis Tribbie; 402-571-5004; [dtribbie@hughesmachinery.com](mailto:dtribbie@hughesmachinery.com).

### April 27–28, 2011

**Advanced Management of Compressed Air (Level 2)** [Omaha, Nebraska]. This intensive 2-day workshop provides in-depth technical information on troubleshooting and making improvements to industrial compressed air systems. Contact: Dennis Tribbie; 402-571-5004; [dtribbie@hughesmachinery.com](mailto:dtribbie@hughesmachinery.com).

### May 11, 2011

**Process Heating Systems Management** [Downey, California]. This 1-day workshop includes an introduction to process heating and process heating equipment, such as furnaces, ovens, dryers, heaters, kilns, etc. Contact: Larry Bennett; 562-803-7570; [lbennett@semprautilities.com](mailto:lbennett@semprautilities.com).

**May 18–June 8, 2011**

**Fundamentals of Compressed Air (Level 1); Four-Part Series** [Webinar]. This Web-based version of the popular Fundamentals of Compressed Air Systems training uses an interactive format that enables the instructor to diagram examples, give pop quizzes, and answer students' questions in real time. Contact: Training Coordinator; [info@compressedairchallenge.org](mailto:info@compressedairchallenge.org).

**May 20, 2011**

**Steam Systems Management** [Dayton, Ohio]. This 1-day course covers the operation of typical steam systems and discusses methods of system efficiency improvement. Contact: Ray Lepore; 937-216-9452; [ray.lepore@protogengroup.com](mailto:ray.lepore@protogengroup.com).

Look for Us...

## ITP Calendar of Events

### March 2011

15–17: [National Facilities Management & Technology Conference \(NFMT\)](#)

30–31: [Globalcon 2011](#)

### May 2011

14–18: [2011 MEP National Conference](#)

### Industrial Technologies Program Contacts

*Click below to request more information about ITP and the services we provide.*

PARTNERSHIP DEVELOPMENT & DEPLOYMENT

Paul Scheihing: [paul.scheihing@ee.doe.gov](mailto:paul.scheihing@ee.doe.gov); (202) 586-7234

TECHNOLOGY DEVELOPMENT

Stephen Sikirica: [stephen.sikirica@ee.doe.gov](mailto:stephen.sikirica@ee.doe.gov); (202) 586-5041

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