Spring 2010 - Vol. 1, Iss. 3

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Energy Matters

U.S. Department of Energy, Industrial Technologies Program

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Nissan Mentors LEADER Companies, Shares Best Practices for Building a Corporate Culture of Industrial Energy Efficiency

On Friday, April 9, 2010, Nissan North America—in conjunction with the U.S. Department of Energy's (DOE's) Industrial Technologies Program (ITP)—cohosted the *Save Energy Now* LEADER Industrial Sustainability and Energy Management Showcase at its automobile manufacturing plant in Smyrna, Tennessee. Nissan North America's Vice President Bill Krueger kicked off the event by explaining that "the whole idea is to build a collaborative network of best practices." Not only did Nissan celebrate its energy efficiency achievements and offer some of its best practices to more than 100 government, utility, state, university, nonprofit, LEADER, and potential LEADER participants, but it also recognized that it still has much to learn. Krueger ended his speech by challenging each participant to give Nissan three ideas for how it could further improve its energy efficiency and environmental performance. By the end of the day, Nissan had received more than 90 suggestions.

Gil Sperling, senior policy advisor to the Assistant Secretary of Energy Efficiency and Renewable Energy, addresses the role of industrial energy efficiency in national energy security at the Save Energy Now *LEADER Showcase hosted by Nissan North America.*

In addition to senior-level attendance by DOE and the Tennessee Energy Policy Office, two state senators also participated to see the energy efficiency progress and best practices sharing in action at the local plant. Seven Fortune 500 companies that have not yet taken the LEADER Pledge also attended to learn more about energy efficiency and the benefits of partnering with DOE.

The showcase highlighted the value of public–private sector partnerships in reducing energy intensity in the industrial sector. Nissan's three U.S. manufacturing plants have received a combined total of nine energy assessments sponsored by ITP in conjunction with Oak Ridge National Laboratory and Industrial Assessment Centers at Tennessee Tech University and Mississippi State University. In addition to assessment support, they have rallied their supply chain, local utilities, and the state government to help implement the energy efficiency projects that are saving Nissan more than $10 million annually in reduced energy costs. Nissan became a *Save Energy Now* LEADER in October 2009 and received the ENERGY STAR® Partner of the Year award in March 2010.

The company has also received DOE support for several related energy projects at its plant, including

1. A $1.4 billion loan guarantee for retrofitting the Smyrna plant and building a lithium-ion battery plant onsite to assemble the zero-emissions electric Nissan LEAF
2. A DOE State Energy Program grant for 70% of the cost to implement eight energy efficiency projects at its Mississippi plant that will save $700,000 in energy costs annually
3. A DOE grant for deployment of methanol fuel cells to power small tug mobile equipment.

Nissan's industrial energy efficiency accomplishments are not only attributed to support from public and private partners, but also through strong corporate leadership. An implementation pitfall for many manufacturers seeking to sell the "business case" for energy efficiency is an inability to artfully connect technical data with corporate decision making. At Nissan, this hurdle was overcome by holding each member of its energy team accountable, maintaining transparency of energy data across the entire organization, and designing user-friendly monthly budget summaries for management. Nissan has not only internalized a corporate culture of energy management, but has also instilled that value within its employees by offering several energy fairs that have helped bring efficiency home. Nissan believes this model of Behavioral-Based Sustainability comes full circle in

Snapshot: Nissan's Implemented Projects

- Installed variable-frequency drives
- Reduced the number of air compressors
- Lowered air pressure

Jeffrey Walker, supervisor for ITP Partnership Development & Deployment, presents Nissan North America's Vice President Bill Krueger with a recognition plaque for hosting the Save Energy Now *LEADER Industrial Sustainability and Energy Management Showcase.*

terms of payback when its employees bring a sustainability mindset back to work with them.

The showcase exemplified the idyllic cooperation that ITP envisioned when it set out to make impacts in the industrial sector through the LEADER initiative: committed companies making great strides toward energy intensity reductions with the financial and technical support of government, universities, national laboratories, utilities, and nonprofit organizations. The event was the first of its kind for the LEADER program, in which a company elevated its contributions to energy efficiency by embodying the LEADER philosophy and providing mentorship to others.

Benchmarking with competitors, sharing best practices, and comparing metrics are actions that Nissan has taken to continue to learn from its peers, maintain an economic edge, and give back to its community. ITP aims to instill this kind of leadership and mentorship throughout the U.S. industrial sector with the support of the LEADER program. As a further testament to the value that many attendees found in the event, four more companies expressed interest in hosting LEADER showcases. Gil Sperling, Senior Policy Advisor to Assistant Secretary Cathy Zoi, rightly observed that "*Save Energy Now* LEADER is a tremendous opportunity for you to take control of your energy use…let's find a way to work together."

The event presentations are available on the *Save Energy Now* LEADER Web page: www.eere.energy.gov/industry/saveenergynow/leader.html.

From Shop Floor to Top Floor—Best Business Practices in Energy Efficiency

ITP's Thursday Webcasts for Industry *Series Features Pew Center on Global Climate Change's Latest Report*

With rising energy prices and climate change legislation trending to the forefront of domestic and global policy reforms, companies across the United States are placing heightened importance on the reduction of energy intensity and associated carbon emissions. Those companies paying greater attention to energy efficiency are reporting increases in productivity, billions of dollars in savings, and millions of tons of avoided greenhouse gas emissions, according to the Pew Center on Global Climate Change's recently released report, *From Shop Floor to Top Floor: Best Business Practices in Energy Efficiency*.[1] The report documents cutting-edge energy efficiency strategies, describes best practices, and provides guidance and resources for other businesses seeking to reduce energy use in their internal operations, supply chains, and products and services.

Andre de Fontaine—a Markets and Business Strategy Fellow at the Pew Center—delivered a Webcast summarizing findings from the report on April 1, 2010, as part of the U.S. Department of Energy's (DOE's) Industrial Technologies Program's (ITP's) *Thursday Webcasts for Industry* series. Mr. de Fontaine provided an overview of the Pew Center, its Business Environmental Leadership Council (BELC), and key findings from the report, including the motivations driving businesses to adopt more aggressive energy efficiency strategies and the common barriers to implementing organization-wide efficiency initiatives.

Background

Mr. de Fontaine began by explaining that the report stemmed from a shift in business leaders' perceptions of energy and climate change issues. The combination of rising energy prices, increasing concern about climate change, and growing consumer

support for energy and environmental issues has driven many organizations to make corporate environmental commitments. Energy efficiency has surfaced as a top strategy for companies to act on these commitments, and many are going well beyond the scope of earlier efforts.

The Pew Center set out to explore the best practices in corporate energy efficiency strategies, focusing on management approaches to improving efficiency throughout a company. Using a grant awarded by Toyota, the Pew Center launched the Corporate Energy Efficiency project. This project was a three-year effort, which included a survey of BELC members and other leading companies, in-depth case studies of six companies with exceptional programs and strategies, four BELC workshops on key energy efficiency topics, and broad research in the corporate energy field.

Overview and Findings

A key finding from the report noted by Mr. de Fontaine was the extent to which climate change commitments are driving corporate energy strategies. He indicated that as companies are committing to carbon reduction and evaluating their carbon emissions, they are beginning to see energy use in a new light. On average, the companies that were surveyed reported spending less than 5% of total revenues on energy—but when they calculated their carbon footprints, they typically found their energy consumption accounting for the majority of their emissions impact.[2] Therefore, energy shifts from a small-cost item to the largest contributor of their carbon footprints.

Additionally, Mr. de Fontaine went over the elements of the best corporate energy efficiency strategies, which the report summarized into "Seven Habits" of core practices and principles:

- Efficiency is a core strategy.
- Leadership and organizational support are real and sustained.
- The company has SMART (specific, measureable, accountable, realistic, and time-bound) energy efficiency goals.
- The strategy relies on a robust tracking and measurement system.
- The organization puts substantial resources into efficiency.
- The energy efficiency strategy shows results.
- The company effectively communicates efficiency results internally and externally.

Another point of discussion included the common challenges and barriers faced by companies when implementing organization-wide energy initiatives. The most common barriers identified included a lack of project funding, lack of staff time and expertise, inadequate management tools, and insufficient technical information.

Case studies of six highly effective corporate energy efficiency programs supplemented the report. The case study companies included The Dow Chemical Company, United Technologies Corporation, IBM, Toyota, PepsiCo, and Best Buy. Mr. de Fontaine addressed aspects of the companies' efficiency initiatives that are helping them achieve significant reductions in energy use and carbon emissions. While some companies have integrated approaches to achieving superior corporation-wide energy performance, others have specific initiatives targeting products and services, the supply chain, and internal operations.

From Shop Floor to Top Floor: Best Business Practices in Energy Efficiency documents what organizations are doing and what they can do to reduce energy use and carbon emissions. With business accounting for a large amount of energy use in the United States, the Pew Center's study suggests that they not only have an opportunity to face today's energy and climate challenges, but they also possess the tools needed to do so.[3]

Additional Information

For the complete report, *From Shop Floor to Top Floor: Best Business Practices in Energy Efficiency*, go to the Pew Center on Global Climate Change's Web site: http://www.pewclimate.org/energy-efficiency/corporate-energy-efficiency-report.

To access or download (PDF and audio file) Mr. de Fontaine's presentation, visit ITP's *Thursday Webcasts for Industry* page: http://www1.eere.energy.gov/industry/resources/thursday_webcasts.html.

To receive e-mail notifications on upcoming *Thursday Webcasts for Industry* and other ITP news, please go to http://www1.eere.energy.gov/industry/subscribe/index.html.

ITP's *Thursday Webcasts for Industry* help industrial personnel learn about DOE software tools, technologies, partnership opportunities, and other resources that can be used to save energy and reduce carbon emissions. They occur on the first Thursday of every month from 2:00 to 3:00 p.m. Eastern Time. You can register to participate in upcoming Webcasts by visiting the ITP events calendar (http://www2.eere.energy.gov/industry/newsandevents/events.html) or the Best Practices training calendar (http://www1.eere.energy.gov/industry/bestpractices/events_calendar.asp).

Endnotes

[1]Pew Center on Global Climate Change, From Shop Floor to Top Floor: Best Business Practices in Energy Efficiency, April 2010, Page iii, http://www.pewclimate.org/docUploads/PEW_EnergyEfficiency_FullReport.pdf.

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DOE's Energy Management Demonstrations Project

Charting a Course toward Continuous Improvement

It started in Texas (as big things sometimes do) and then moved to the Northwest, picking up both speed and support. It is now taking root in several other regions across the country. The U.S. Department of Energy (DOE), working through the Industrial Technologies Program's (ITP's) *Save Energy Now* initiative, is sponsoring a series of energy management demonstrations to provide U.S. industrial facilities with a roadmap for achieving continuous improvement in energy efficiency through strategic energy management.

Project teams composed of energy management experts working with ITP are now in the process of recruiting manufacturing plants in the Northwest, Midwest, Mid-Atlantic, Northeast, and Southeast regions to participate in these energy management demonstrations. The companies selected will test the elements of Superior Energy Performance (SEP), a forthcoming American National Standards Institute-accredited energy management certification program currently under development by the U.S. Council for Energy-Efficient Manufacturing (USCEEM). Upon its expected launch in 2011, the SEP certification program will provide companies with a proven framework for implementing a full-fledged energy management system (standard) and validating energy intensity reductions. Prior to completion, however, USCEEM will take lessons learned from the companies participating in the energy management demonstrations to help shape and refine the certification program.

Companies taking part in the energy management demonstrations will have the opportunity to reap quite a few benefits of their own. They will have access to training workshops, one-on-one coaching, and Web-based seminars, as well as a suite of tailored technical assistance, energy assessments, and software tools made available by ITP's *Save Energy Now* LEADER program. This support is designed to help participating plants reduce their energy use and costs by 5–15% over three years. In fact, the guidance and technical assistance provided through SEP constitutes key components of the larger *Save Energy Now* LEADER strategy—a national initiative sponsored by ITP that aims to drive a 25% reduction in industrial energy intensity in 10 years. As industry currently accounts for nearly one-third of all U.S. carbon emissions and represents one in five private-sector jobs, the potential SEP has in making progress toward greater industrial energy efficiency

ISO 50001
Energy Management System Standard

One of the principal barriers to promoting widespread adoption of energy management best practices is the lack of clear and comprehensive standards that companies can use to guide the development of an energy management plan and against which to measure performance. Stepping into the breach is the International Organization for Standardization (ISO) with its international energy management system standard, ISO 50001. The United States and Brazil are leading efforts to develop ISO 50001, along with China and the United Kingdom. The international standard is expected to be ready for publication in early 2011, at which point it is expected to replace the current national standard in the United States—the American National Standards Institute (ANSI) Management System for Energy (MSE) standard, ANSI/MSE 2000-2008. The United States' participation in the development of ISO 50001 is being coordinated through ANSI.

The U.S. Department of Energy (DOE) also plans to use ISO 50001 as the organizing framework for the Superior Energy Performance (SEP) energy management certification program. DOE is developing SEP in conjunction with the U.S. Council for Energy-Efficient Manufacturing. This will add to the traction that the international standard can be achieved domestically. Features of SEP and the foundational *Save Energy Now* LEADER initiative—which provides the tools, training, and technical resources that enable actual progress toward energy efficiency goals—will lay the crucial groundwork for companies to implement the ISO 50001 standard. Collectively, this assistance and guidance will empower companies to achieve significant and sustained energy savings and greenhouse gas reductions in their plants.

Because ISO 50001 is a voluntary standard as opposed to a regulatory requirement, its uptake will depend on how companies perceive its value to their organization. If widely adopted, it could influence up to 60% of the world's energy use across many economic sectors. In particular, the adoption of ISO 50001 will be driven by factors such as the growth of corporate sustainability programs and the spread of energy management standards along the manufacturing supply chain. Companies may also find the energy and carbon reductions achievable through adherence to the ISO 50001 standard increasingly valuable as a means to comply with possible cap-and-trade regimes that are under consideration, avoid carbon or energy taxes, comport with international climate agreements, or enhance their corporate value by burnishing their green manufacturing credentials.

will strengthen the U.S. economy and provide practical, near-term solutions for significant energy and carbon reductions.

Companies that participate in the energy management demonstrations will also receive national recognition for their commitment to energy efficiency and gain a leg up on their competition by becoming some of the first plants in the United States to be certified through SEP. Importantly, the companies that successfully complete the requirements of the energy management demonstrations will also be well positioned to follow the related roadmap for continuous improvement in energy efficiency and conform to the forthcoming International Organization for Standardization (ISO) 50001 energy management system standard. [See related sidebar.]

The ambitions of this series of energy management demonstrations extend beyond the more concrete goals of providing an energy efficiency roadmap and contributing to the development of SEP. It is also intended to help build energy management expertise at the state, regional, and plant levels by showcasing lessons learned and best practices. Through this education, the series aims to increase energy savings and reduce associated carbon reductions throughout the nation. By involving industrial personnel at all levels, SEP and the energy management demonstrations encourage a far-reaching culture change in how energy is managed at the facility level. While USCEEM—along with DOE—is guiding the development of the SEP program, once underway, it is intended to become a self-sustaining program through plant certification fees.

Because of the tremendous opportunity represented by the energy management demonstration series and the lofty goals it hopes to attain, companies must meet certain requirements to take part. To be selected, a company should be prepared to assure senior-level commitment to energy management, including the allocation of appropriate resources. Additionally, at least one certified management system must already be in place (e.g., ISO 9001 [quality], ISO 14001 [environmental], ISO 22000 [food safety], OHSAS 1800 [health and safety]). While not an absolute requirement, experience with management system certification demonstrates a well-developed understanding of this project's requirements and a history of commitment to success within a designated time period. A key part of implementing an energy management system is integrating knowledgeable plant personnel into the process; therefore, participating companies must also be willing to dedicate their staff members' time to attend training and actually implement this project's activities at their plants.

Two additional characteristics are necessary for any company wishing to participate. First, in order to be considered, companies must sign the voluntary *Save Energy Now* LEADER Pledge and commit to reducing their energy intensity 25% in 10 years.

Second, companies should be willing to pursue SEP certification through participation in an audit that will look at records showing conformance to the forthcoming ISO 50001 energy management standard and a minimum of 48 months of plant energy consumption data to demonstrate a minimum improvement of 5% in energy intensity over a three-year period.

Four companies with plants in Texas—Cook Composites and Polymers Company; Freescale Semiconductor, Inc.; Owens Corning; and The Dow Chemical Company—kicked things off in May 2008, participating in a pilot project funded by DOE and the Texas State Energy Conservation Office. The Texas Industries of the Future program coordinated the pilot with help from Lawrence Berkeley National Laboratory, Georgia Tech, and Oak Ridge National Laboratory. In October 2009, DOE launched the Northwest Energy Management Demonstration Project in coordination with the Northwest Energy Efficiency Alliance and four participating companies—Grays Harbor Paper, PACCAR/ Kenworth Truck Company, Amcor PET Packaging, and J.R. Simplot Company Aberdeen Food Plant. Moving forward, the energy management demonstrations project will be rolled out in the Southeast, Midwest, Mid-Atlantic, and Northeast regions in Spring/Summer 2010; California and Colorado in Summer/Fall 2010; and will head back to Texas in Fall 2011. In total, 23 states will be included: AR, CA, CO, CT, GA, IL, IN, IA, KY, ME, MA, MN, NH, NC, OH, PA, RI, SC, TN, VA, VT, WI, and WV.

For more information on energy management demonstrations, visit http://www1.eere.energy.gov/industry/energymanagementdemonstrations/index.html.

Best-Kept Secret in Energy Efficiency

National Insulation Association Says Mechanical Insulation Saves Money

While an economic recovery in the United States remains tepid despite relatively positive economic news for the first few months of 2010, commodity prices have rebounded significantly. Energy prices for oil and industrial natural gas are substantially higher than their 2009 lows.[1] High energy prices could undermine any sustained recovery and especially dampen any rebound for manufacturers already battered by the recession. Faced with uncertain energy prices for the foreseeable future, manufacturers and energy managers may want to consider options to reduce price volatility in their energy supply inputs. They may not be in a position to invest in a capital project that uses up scarce resources during a slow business climate.[2] They may likewise need options that generate a payback under short time horizons. One such (often overlooked) energy efficiency strategy option is mechanical insulation.

To corporate energy or plant managers, mechanical insulation may not evoke the same excitement as other industrial systems with gauges and other electronic monitoring controls.[3] However, mechanical insulation's low-tech benefits are hard to ignore. First, they come in countless commercial and industrial applications.[4] They can cover vessels, ducts, boilers, and piping and can crosscut numerous industries. Systems cover both hot and cold scenarios and can ensure thermal, acoustical, and personnel safety.[5]

If wide application of mechanical insulation systems doesn't generate interest in itself, then one should consider the effect they can have on the annual operating budget. Often, mechanical insulation systems have a payback period of 12 months or less,[6] which equates to a 100% annual return. Recently, the U.S. Department of Energy's Industrial Technologies Program (ITP) has been working with the National Insulation Association (NIA)—a long-time partner of ITP—to specifically analyze *Save Energy Now* energy audits and extrapolate information to put mechanical insulation's benefits into context. Together, ITP and NIA analyzed over 700 *Save Energy Now* assessments conducted since 2006. Though the audits focused on mechanical insulation for just process heating and steam systems and not insulation's wider potential application for the reviewed plants, savings were significant. Across small, medium, and large plants, mechanical insulation improvements had an approximate 9–12-month payback period. Clearly, mechanical insulation upgrades have the potential to save large quantities of energy and even larger amounts over wider applications, especially considering the opportunities in the commercial market.

Mechanical insulation systems are also among the few manufactured products that save more energy than it takes to produce them. NIA estimates that over a 20-year lifespan, mechanical insulation systems save between 140 and 500 times the energy that it takes for manufacturers to produce them.[7]

Despite the belief that mechanical insulation is not an "exciting" subject, NIA's Executive Vice President and CEO Michele Jones recently said, "It is essential to begin thinking differently about

mechanical insulation and the value it can provide."[8] During construction of a new facility, it could be dangerous to consider mechanical insulation under "economic thickness" calculations, given that energy prices have risen substantially over the last 10–20 years. Original cost assumptions may change as energy has become more expensive. Furthermore, value engineering "mechanical insulation almost always means compromising the insulation thickness, changing the materials or system (a cheaper substitute), or eliminating the insulation." The problem with this is that with insulation reduced, "the equipment works harder, thus increasing operating costs" and decreasing the equipment's operating life.[9] You may end up paying more by not investing up front.[10] Usually, insulation is thought of as an expense. Instead, managers should think of it as an investment with returns often in under a year.[11]

Thankfully, resources exist to help facility managers make smart mechanical insulation investments to their systems. Of course, ITP's *Save Energy Now* assessments can analyze insulation improvements for industrial heating and steam processes. The National Institute of Building Sciences has a mechanical insulation design guide containing several free online calculators (http://www.wbdg.org/design/midg.php). The North American Insulation Manufacturers Association has a free software tool called 3E Plus, available for download online at www.pipeinsulation.org. This program can eliminate the complexity in determining the appropriate insulation thickness. It can calculate British thermal units saved, cost of reduction, the available return-on-investment opportunity, and emissions savings for gases such as nitrogen oxide and carbon dioxide.[12] This tool can also analyze the upgrade-versus-replace scenario for a potential project.[13]

Other resources may become more widespread as mechanical insulation gains more attention. Adding insulation beyond what is required by ASHRAE 90.1—the American Society of Heating, Refrigerating and Air Conditioning Engineers'

Standard 90.1 (Energy Standard for Buildings Except Low-Rise Residential Buildings) and one of the most recognized building energy standards—has real benefits, and ASHRAE is reviewing higher insulation levels for its next update.[14] Looking to secure Congressional funding, NIA and the International Association of Heat and Frost Insulators and Allied Workers are working together to launch a national education and awareness campaign to promote mechanical insulation as a cost-effective energy-saving option for industry. An initial scope of work for such a program is in development with ITP. Through this program, there will be Webinars—some of which ITP may host—videos, and other marketing efforts to increase the awareness of mechanical insulation's benefits.

"Mechanical insulation is one of the best-kept secrets in energy efficiency, and we need to turn it into one of the first things people think about when they want to save money. It not only saves energy but reduces greenhouse gas emissions and extends the life of equipment. The numbers speak for themselves—we just need to get the word out," says Glenn Frye, president of NIA.

How It Affects You

Congress recently introduced a bill known as the *Building Star Energy Efficiency Act of 2010* to jumpstart the retrofits of commercial and industrial buildings. This $6 billion bill would offer financial investments and other rebates for hiring laid-off construction workers and other tradesmen affected by the current construction downturn—including those working with mechanical insulation—to perform retrofits and improve energy efficiency in the economy.[15] New retrofit incentives could boost manufacturing's rebound. With strained long-term capital budgets, energy managers may consider mechanical insulation as an attractive investment to boost plant productivity. In addition, the tax incentive H.R. 4296 has been introduced to provide longer-term incentives for increasing mechanical insulation maintenance activities and going beyond the 2007 ASHRAE 90.1 levels. There has never been a more important time to think about insulation differently.

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Success in Industry

Power Equipment Company Takes Top-Down Approach to Energy Efficiency

At Briggs & Stratton, the drive for improved energy efficiency does not stop at the door to the manufacturing plants. The power equipment manufacturer, headquartered in Wauwatosa, Wisconsin, has made a commitment to energy management "from top-to-bottom" by organizing employee energy teams at each of its facilities.

Richard Feustel, the corporate energy manager of Briggs & Stratton, has been instrumental in organizing these energy teams, which help to make employees more aware of the benefits of reduced energy usage. This is a practice that fits well with the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy's own goal of promoting a culture change by capturing hearts and minds. These energy teams are the driving force behind initiatives that have helped decrease Briggs & Stratton's energy costs while improving environmentally friendly practices. Their efforts have enabled the company to move quickly in adopting new technologies, and they continue to generate excitement for positive change among employees and consumers. Feustel has found that people's experience with energy management at home makes them more engaged and interested in contributing to energy management at work, where they become more comfortable asking questions about topics such as dimmable lights, motion sensors, and ways to turn down the thermostat.

Briggs & Stratton conducts a variety of events and initiatives to engage its consumers and employees. Along with sponsoring an Energy Awareness Fair and a compact fluorescent light bulb sale for employees, the company also promotes employee ride-share programs and conducts computer and electronics recycling efforts for employees and neighbors to help further solidify its commitment to sustainability. To demonstrate the effectiveness of the program, according to Feustel, the Briggs & Stratton Energy Team has implemented projects that have saved nearly 30.1 million kilowatt-hours over the last three years (7.8 million in 2007; 7.1 million in 2008; 15.2 million in 2009).

For more information, visit the Briggs & Stratton sustainability Web site at www.briggsandstratton.com/corp/about_us/environment.

Portland Bread Maker Puts Energy Savings at the Forefront

Many companies in the industrial manufacturing sector are beginning to realize the benefits of increased energy efficiency and are taking energy-saving measures much more seriously. But you know a company is truly adopting an energy efficient culture change when it reinvents the company motto to discuss its impact on the environment. And that is exactly what has happened at Franz Family Bakeries of Portland, Oregon, which developed a whole new campaign based upon receiving a 2009 Energy Champion award—"Bread has never tasted so sustainable."

To receive this recognition, Franz Bakery completed a *Save Energy Now* energy assessment with the U.S. Department of Energy's Industrial Technologies Program in 2008. Marc Albers, president and chief operating officer of the food manufacturer, says Franz has taken many steps—including the installation of an oxidizer—to make its facility more eco-friendly and keep its city and the environment as clean as it can. The company received its *Save Energy Now* Energy Champion award for achieving more than 250 billion British thermal units total energy savings or more than 15% total energy savings at its facility in Portland. "This is a tremendous recognition, and I am really proud of our team for identifying and implementing environmentally conscious changes to the way we do business," Albers said of the award.

Franz is committed to working with employees, customers, and neighbors in practicing sustainability and green business strategies. Franz Bakery's environmentally friendly business practices revolve around keeping water clean, conserving and using clean energy sources, recycling/reducing packaging, and maintaining fuel efficiency through all distribution channels. In May 2009, a catalytic oxidizer was installed at the Portland Bakery to remove an estimated 95% of all ethanol emissions from bakery operations.

Franz Bakery is the largest family-owned baking company in the western United States with six baking facilities throughout the Northwest. For more information, visit the Franz Web site at www.franzbakery.com.

States & Utilities Corner

Gulf Coast Industrial Energy Efficiency Forum

The Gulf Coast Industrial Energy Efficiency Forum—the fourth in a series of U.S. Department of Energy Industrial Technologies Program regional industrial technical meetings—was recently held in conjunction with the Industrial Energy Technology Conference in an effort to connect U.S. Gulf Region industrial manufacturers with the financial and technical resources needed to boost the implementation of energy efficiency or environmental projects at their facilities. The Gulf Coast Forum took place May 20–21, 2010, at the Royal Sonesta Hotel in New Orleans, Louisiana. Industrial manufacturers from Louisiana, Mississippi, and east Texas were invited to attend, as well as resource providers that service those states.

The Gulf Coast Forum featured a *Save Energy Now* LEADER Pledge-signing event, where new LEADER Companies had the opportunity to voluntarily pledge to reduce their energy intensity 25% over the next 10 years. An awards ceremony was also held to recognize local industrial manufacturers that reduced their energy intensity by at least 7.5% since participating in an ITP-sponsored energy assessment, be it an Energy Savings Assessment or assessment conducted by a university-based Industrial Assessment Center. The Gulf Coast Forum also featured the Senior Executive Roundtable, where industry, utility, and energy efficiency leaders gathered to discuss barriers to improving industrial energy efficiency and steps taken to mitigate those challenges.

For more information, please visit the Gulf Coast Forum's Web site at http://www.gulfcoastforum.govtools.us/.

Gulf Coast Industrial Energy Efficiency Forum

In the Spotlight: Michigan

Michigan passed *Clean, Renewable, and Efficient Energy Act* (Senate Bill 213) into law in October 2008. Under this legislation, electric and natural gas rate-regulated utilities that provide power to the state must file an energy optimization plan with the Michigan Public Service Commission (MPSC). These plans explain what the utility expects to do to reduce customer energy costs in the future; they also typically feature the development of energy efficiency incentive programs, load management, and energy conservation. As shown in Table 1, MPSC has asked electric utilities to achieve 0.3% energy savings during the inaugural year, 0.5% in 2010, 0.75% in 2011, and 1.0% in 2012 and subsequent years. Natural gas utilities were asked to achieve 0.1% energy savings in 2009, 0.25% in 2010, 0.5% in 2011, and 0.75% in 2012 and subsequent years. There is no penalty for utilities that do not meet the energy-savings-reduction goals.

Utilities have embraced these goals, as all major investor-owned utilities are offering financial and technical assistance to industrial customers through their new energy-management programs. For example, Consumers Energy and DTE Energy offer a variety of rebates for the purchase and installation of energy efficiency equipment, including a customs measure rebate for equipment not covered under a prescriptive program. In addition, Michigan Gas Utilities offers financial assistance and technical services for industrial energy efficiency projects. Electric cooperatives and public power utilities have also embraced industrial energy efficiency programs. For more information on these resources and to find others, please visit the newly re-released State Incentives and Resources Database at http://www1.eere.energy.gov/industry/states/state_activities/incentive_search.aspx.

Table 1: Michigan Public Service Commission's Energy Savings Reduction Goals

Year	2009	2010	2011	2012+
Electric %	0.3%	0.5%	0.75%	1.0%
Gas %	0.1%	0.25%	0.5%	0.75%

Tools of the Trade

MotorMaster+

MotorMaster+ is a free online software tool developed by the U.S. Department of Energy's Industrial Technologies Program (ITP) to support motor and motor systems planning by identifying the most efficient action for a given repair or motor purchase decision. It accomplishes this by providing a motor comparison feature that allows users to choose between repairing, rewinding, or replacing motor equipment.

This tool quickly identifies inefficient or oversized facility motors and computes the savings that can be achieved by replacing older, standard efficiency motors with National Electrical Manufacturers Association (NEMA) premium efficiency motors. MotorMaster+ includes a catalog of more than 20,000 low-voltage induction motors and features motor inventory management tools, maintenance log tracking, efficiency analysis, energy- and cost-savings evaluation, energy accounting, and environmental reporting capabilities.

MotorMaster+ is designed for industrial energy coordinators, facility managers and engineers, plant electricians and maintenance staff, procurement personnel, and utility auditors who are interested in improving the energy efficiency of motor systems at industrial facilities.

Inputs

To create an in-plant motor inventory, you will need to input the following information:

- Facility and department information
- Utility and rate schedule
- Process-related operating schedules
- Motor inventory information, including motor nameplate information, operating profile, load status, and field measurements
- Life cycle economics, including depreciation method, costs, financing, electricity use and cost, and project life.

Outputs

Based on your inputs, MotorMaster+ will calculate and display the following information:

- Expanded list of more than 20,000 motors from 14 manufacturers, including NEMA premium efficiency medium voltage (>600 volt) motors
- Analysis of repair-versus-replace cost effectiveness for in-service motors at a facility
- Technical data to help optimize drive systems
- Motor purchasing information
- Energy and dollar savings, simple payback, cash flows, and after-tax rate of return on investment from using selected particular premium efficiency motor in a new purchase or retrofit application
- Energy accounting, conservation savings tracking, and greenhouse gas emission reduction reports.

MotorMaster+ International

ITP also offers MotorMaster+ International, which includes many of the same capabilities and features of MotorMaster+ but is tailored to work internationally. For instance, the tool has a multilanguage capability (with the current release supporting Spanish, French, and English) and allows users to conduct economic analyses using various currencies. The software also allows users to evaluate repair/replacement options for a broader range of motors, including those tested under the Institute of Electrical and Electronic Engineers standard and the International Electrotechnical Commission (IEC) methodology. The current version of MotorMaster+ International contains manufacturers' databases for over 25,000 NEMA motors and over 7,200 IEC motors.

To get started with MotorMaster+ or MotorMaster+ International, visit http://www1.eere.energy.gov/industry/bestpractices/software_motormaster.html.

Additional software tools that will help you identify and analyze energy system savings opportunities in your plant or industrial facility are also available for download on ITP's Web site: http://www1.eere.energy.gov/industry/bestpractices/software.html.

Research & Development

Breakthroughs in Battery Science

Advanced Materials Research Bucks Tradition

Today's scientists are using advanced material science to push the design capabilities of batteries, resulting in the discovery of unimaginable applications while also overcoming some of industry's greatest technological barriers, such as capacity fading, charge/discharge time, storage capacity, weight, material cost, and infrastructure deployment. The lithium-ion battery has been the cornerstone of the secondary cell design due to its ability to hold a charge when not in use and also for its high energy-to-weight ratio;[1] therefore, it is no surprise that a lot of the current research has been focused on further developing this design.

Current Design

The basic battery consists of three items: a cathode material (the positive end), an anode material (the negative end), and an electrolyte material, which is a liquid that allows ions to move from the anode to the cathode—this nonreversible process will

continue until the stored charge is exhausted. This basic three-piece design is known as a primary cell and has been vastly improved upon over the years. In fact, look for a new and improved version of primary cell batteries this summer under the name Oxyride that guarantees to make the time between changes even longer.[2] A large portion of today's batteries, however, can be discharged and then recharged for additional use. These types of batteries are called secondary cells (see Table 1 for list of primary and secondary cells).

Advances in Materials

Overcoming Capacity Fading

Some of the most promising material science research attempts to add silicon to the anode side of the lithium-ion battery. This has the potential to increase the battery's storage capacity by a factor of 10 while reducing the time it takes to recharge.[3] The downside, however, is silicon's inability to maintain its structure during the charge/discharge cycles—it expands to four times its original size during the charging process. Therefore, as the battery cycles back and forth between charging and discharging, the silicon breaks down and fractures. This degradation leads to capacity fading, or the battery's inability to hold a charge.

One way to overcome capacity fading and to increase the number of times the battery can be charged/discharged is to bond silicon to another substrate material, such as titanium or carbon. A group of Boston College chemists, using silicon-coated titanium nanonets, were successful in achieving an increase in storage capacity of 1,000 milliamps-hour per gram (mA-h/g) while keeping an average of 0.1% capacity fade per cycle between the 20th and the 100th cycles.[4] While still being developed, scientists believe that this type of research will lead to greatly expanded future applications.

Moving beyond the Internal Battery

Other battery designers have focused more on the weight issue created when a large amount of energy is required, such as for vehicles. The advancement of carbon fiber materials has allowed scientists to develop a strong, lightweight, moldable material that can store and discharge electricity without the need of a chemical process. This breakthrough is thought to potentially turn the outer casing of hand-held items into batteries themselves, thereby eliminating internal batteries altogether. Further, hybrid or electric vehicles could gain an added capacity for electrical energy while also maintaining a lighter yet durable design.[5] This design helps to break the mold of what batteries are thought to look like, as well as how they are made.

Bending the Rules with Nanotechnology

Material scientists, familiar with existing battery materials, are also turning to new tools that they hope will unlock new designs.

Table 1: List of Primary and Secondary Cells

Primary Cells	Secondary Cells
Alkaline battery	Lead-acid battery
Aluminium battery	Lithium-ion battery
Chromic acid cell	Lithium-iron phosphate battery
Lithium battery	Lithium-sulfur battery
Mercury battery	Lithium-titanate battery
Nickel-oxyhydroxide battery	Nickel-cadmium battery
Silver-oxide battery	Nickel-hydrogen battery
Zinc-air battery	Nickel-iron battery
Zinc-carbon battery	Low self-discharge NiMH battery
Oxyride battery	Nickel-zinc battery
	Sodium-sulfur battery
	Zinc-bromine battery

For example, through the use of advances in nanotechnology, scientists have been able to create a battery with a stroke of a brush—literally. By using carbon nanotubes and silver nanowires, scientists at Stanford University have designed an "ink" that will turn paper into bendable batteries and super capacitors. The charge/discharge cycles are thought to be an order of magnitude greater than lithium-ion batteries, which are limited to around 1,200 cycles. The high surface-to-volume ratio of the nanomaterials allows for a quick transfer of electricity, and the uses range from industrial energy storage to hybrid vehicles.[6]

Going Organic

Even more impressive breakthroughs are questioning traditional battery materials. New advances in polymer science have led to flexible, razor-thin batteries made of plastic and organic compounds. Using a redox-active organic polymer film approximately 200 nanometers thick, scientists are able to create a high charge/discharge capacity battery, which means it can charge much more quickly than conventional batteries and can more quickly discharge a larger amount of energy. Uses for this design include pocket-sized integrated circuit cards used for memory storage and microprocessing.[7]

Taking Charge

Finally, with all of the emerging technology breakthroughs and advances in materials, some scientists have turned their research toward battery delivery systems. While it may be convenient to purchase batteries for your remote control at the drug store, the same is not true for vehicles that need a new charge between destinations. German chemists at Fraunhofer Institute for Chemical Technology ICT in Pfinztal have developed a new type of redox flow battery that would allow people to change the battery's discharged electrolyte fluid for a recharged fluid—much

like refilling a gas tank. The battery uses two fluid electrolytes containing metal ions that flow through porous graphite felt electrodes, separated by a membrane that allows protons to pass through. This type of delivery system could work well with existing infrastructure, and even more excitingly, the discharged electrolyte fluid could be recharged at the deposit station via clean energy provided by wind turbines or solar plants for the next user.[8]

Closing

The use of advanced materials has allowed scientists to blur the lines between what was and what will be. While some research is more promising than others, it stands to reason that traditional battery design will be forever changed. All of these designs push the boundaries of how people think of batteries, but more importantly, they are leading to expanding possibilities that will revolutionize the battery industry and the various industries that batteries serve.

Endnotes

1 http://www.pcworld.com/article/188624/lithiumion_battery_life_could_reach_20_years.html

2 http://www.sciencedaily.com/videos/2005/0606-longerlasting_battery.htm

3 http://www.nature.com/nnano/journal/v3/n1/full/nnano.2007.411.html

4 http://www.sciencedaily.com/releases/2010/02/100216101157.htm

5 http://www.sciencedaily.com/releases/2010/02/100205115808.htm

6 http://www.sciencedaily.com/releases/2009/12/091207165035.htm

7 http://www.sciencedaily.com/releases/2007/03/070323141052.htm

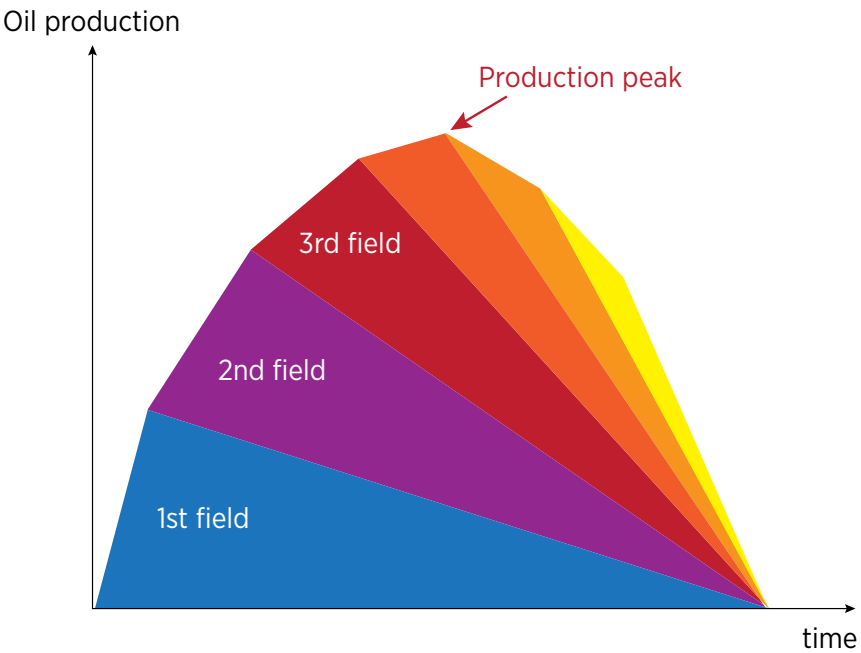
Markets & Trends

M. King Hubbert and U.S. Oil Production

Current geological theory holds that fossil fuels are produced through extremely slow geological and biological processes and, as such, there is a limited amount of fossil fuel available for use. Experience shows that in any given geological area (such as a single oil, coal, or gas basin), the first initial finds (fields) are the largest, remaining fields are smaller, and overall production trails off to a point where further production is economically infeasible (see Figure 1).

Based on experience with the production of individual fields and the United States, M. King Hubbert, a geophysicist for Shell Oil, devised what are now known as the the Hubbert Curve and the Hubbert Peak Theory to predict the peak of oil production. In 1956, Hubbert predicted that U.S. oil production would peak between 1965 and 1970. U.S. production, in fact, peaked in 1970 (see Table 1 and Figure 2).

Figure 1: Generally accepted progression of oil production from fields within a given, limited geographical area



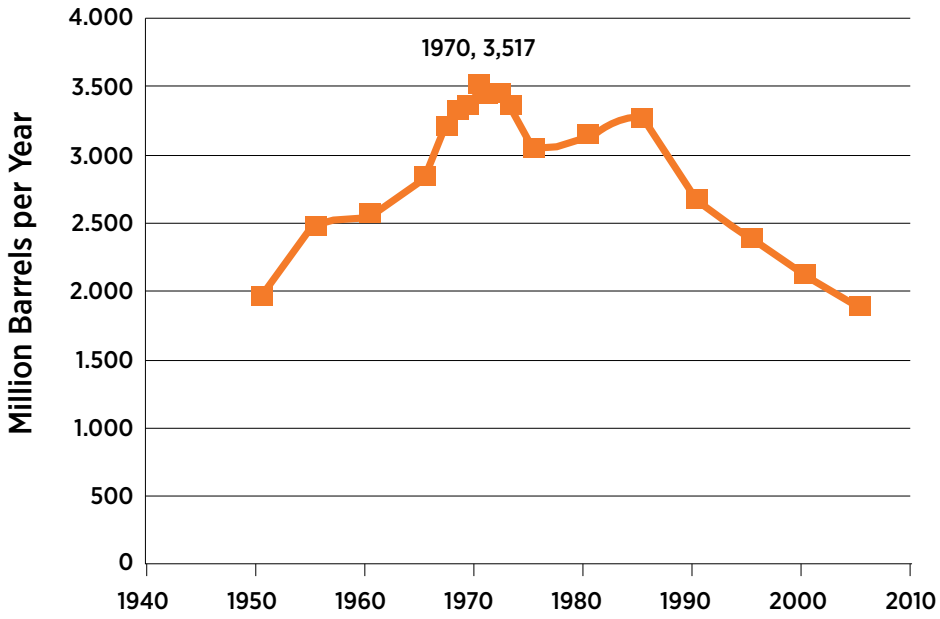
Source: Crude Oil – The Supply Outlook, Ludwig-Bölkow-Systemtechnik GmbH, 2007.

Table 1: U.S. Crude Oil Production, 1950–2005

Year	Million Bbls
1950	1,974
1955	2,484
1960	2,575
1965	2,849
1967	3,216
1968	3,329
1969	3,372
1970	3,517
1971	3,454
1972	3,455
1973	3,361
1975	3,057
1980	3,146
1985	3,275
1990	2,685
1995	2,394
2000	2,131
2005	1,890

Source: U.S. DOE Annual Energy Review, 2008, Table 5.1 Petroleum Overview, 1949–2008.

Figure 2: U.S. Crude Oil Production, 1950–2005



Source: U.S. DOE Annual Energy Review, 2008, Table 5.1 Petroleum Overview, 1949–2008.

Though U.S. production is higher today than Hubbert's predictions (both in 1956 and later updates), domestic demand for liquid fuels far outstrips current domestic production, and there is no reasonable expectation that enough additional production will come online to meet demand. Thus, the United States must import a significant amount of fuel. The questions from here on out are this: If the world follows the lead of the United States, when will world oil production peak? When will worldwide demand outstrip any potential production?

Extrapolation to World Production

Hubbert's invention was the beginning of a more accurate prediction of oil production, and it has been expanded to predict and evaluate the production of other nations and of the world. Based on reserves, the rate of new oil well discovery, and oil production rate, the Hubbert Curve predicted a largely symmetrical growth and decline and was more accurate than earlier prediction methods. Since that time, similar prediction curves have been created and expanded to include more data to take into account market demand, increasing populations, technological innovations, discovery of additional reserves, and improved energy (or fuel) efficiency. As with Hubbert's original curves, which also analyzed coal and natural gas, these prediction curves have been used to cover many energy sources, fuel types, and other natural resources—and, in their ultimate form, attempt to predict the peak and decline of key world resources and to help plan and prepare for potential crises.

Effects of the Global Recession, New Exploration, Drilling, and Improved Estimations

As an alternative to peak oil, there are the possibilities that oil production won't have any peak (for the relevant future), or more likely that there will be a plateau or a decline in production more gradual than what would be predicted by the Hubbert Curve or similar curves. One of the anticipated drivers of these alternative outcomes is the effect of continuing demand and rising prices that push investors and technology developers toward new sources of fuels, new production technologies, and alternative energy technologies. Not only does this provide access to greater and more varied sources of petroleum, but it creates a kind of feedback loop, decreasing demand on existing reserves and allowing them to draw down more slowly.

In addition to the feedback loop of demand and prices, there are a number of factors that make estimation of the point of peak oil uncertain. Exact oil reserves and production numbers are kept secret by both nations and companies; this is often done to prevent uncertain market conditions or to prevent

concern about specific company prospects. Most international summaries of reserves and production are simply best-available estimates. Additionally, new exploration and drilling technologies are continuously being developed that enable discovery of greater reserves. Tools like the Hubbert Curve and other more computationally intense estimations enable more accurate calculation of supplies.

Good examples of these effects are the estimates of U.S. natural gas reserves. The Potential Gas Committee released an updated estimate of U.S. reserves in June of 2009 that was 35% higher than its 2006 estimate.[1] The increase was attributed to improved technologies, including the ability to more easily access gas trapped in shale rocks. Opposing this reserve increase, the U.S. Energy Information Administration (EIA) just announced that it would use a new calculation for natural gas production numbers that would eliminate overestimation due to its sampling method (extrapolating production numbers based on data from large producers has overestimated the total production when a significant portion of companies are smaller, less-intense producers).[2]

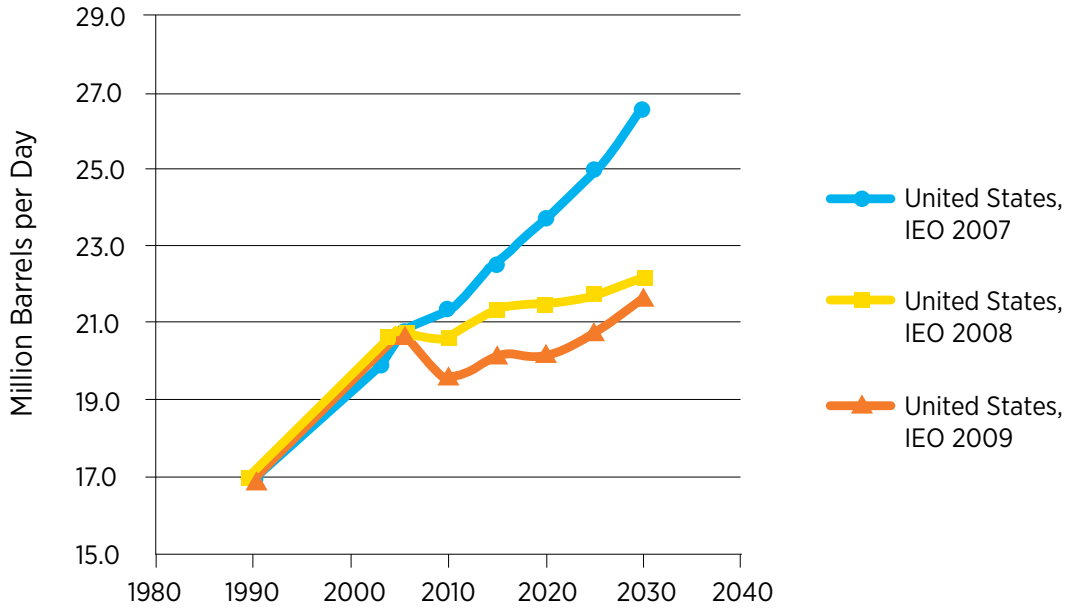
The final major factor affecting worldwide prediction of the supply of oil is the strength of the world economy and the resulting demand for fuel. This can be clearly seen in the recent global recession; the slow global economy has pushed demand for oil down, and oil prices have dropped. The difference the recession has had on predictions of oil's future availability can been seen in the following projections of domestic and global liquid fuels demand (including oil). EIA predicted the sets of data shown here (Tables 2 and 3; Figures 3 and 4) in its annually updated *International Energy Outlook* (IEO).

Table 2: U.S. Liquid Fuels Consumption, 1990–2030

Liquid Fuels Consumption (million barrels per day)											
	History					Projections					Average % Change, 2003–2030
	1990	2003	2004	2005	2006	2010	2015	2020	2025	2030	
US, IEO 2007	17.0	20.0	20.7	-	-	21.4	22.6	23.8	25.0	26.6	1.0
US, IEO 2008	17.0	-	20.7	20.8	-	20.7	21.4	21.6	21.8	22.3	0.3
US, IEO 2009	17.0	-	-	20.8	20.7	19.6	20.2	20.2	20.8	21.7	0.2

Source: EIA *International Energy Outlook*, 2009

Figure 3: U.S. Liquid Fuels Consumption, 1990–2030



Source: EIA *International Energy Outlook*, 2009

[1] Estimate Places Natural Gas Reserves 35% Higher, *NY Times*, http://www.nytimes.com/2009/06/18/business/energy-environment/18gas.html.

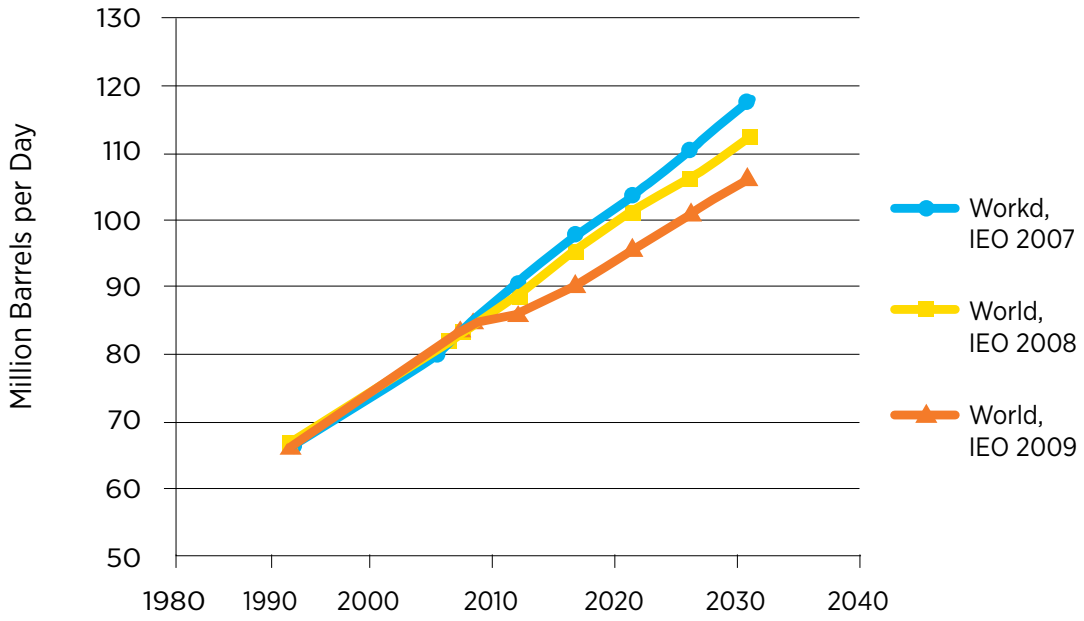
[2] Natural-Gas Data Overstated, *Wall Street Journal*, http://online.wsj.com/article/SB10001424052702303912104575163891292354932.html.

Table 3: World Liquid Fuels Consumption, 1990–2030

Liquid Fuels Consumption (million barrels per day)											
	History					Projections					Average % Change, 2003–2030
	1990	2003	2004	2005	2006	2010	2015	2020	2025	2030	
US, IEO 2007	66.5	79.8	82.5	-	-	90.7	97.3	103.7	110.4	117.6	1.4
US, IEO 2008	66.6	-	82.3	83.6	-	89.2	95.7	101.3	106.5	112.5	1.2
US, IEO 2009	66.7	-	-	84.0	85.0	86.3	90.6	95.9	101.1	106.6	0.9

Source: EIA *International Energy Outlook*, 2009

Figure 4: World Liquid Fuels Consumption, 1990–2030



Source: EIA *International Energy Outlook*, 2009

Estimates of Alternative Fuels Production

One way to combat a potential sudden disruption in conventional oil supplies is to develop alternative, biobased, or other renewable fuels. Current projections of domestic and worldwide alternative fuels production are only expected to reach 10.4% and 5.5% of their respective conventional production by 2030. At these levels, alternative liquid fuels will not be able to stabilize a major decline. Development of technologies like hybrid and electric automobiles will help decrease the demand for liquid transportation fuels and in conjunction with the alternative fuels, may be able to make up a large portion of the gap (see Tables 4 and 5).

As depicted in Figure 5, most oil-producing countries have already seen their production peak, though the key high-production countries have not:[3]

- Kuwait – anticipated in 2013
- Saudi Arabia – anticipated in 2014
- Iraq – anticipated in 2018.

Table 4: Alternative Fuels and U.S. Liquid Fuels Supply, 2006–2030

U.S. Liquid Fuels Supply (million barrels per day)							
	2006	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
Total Alternative Fuels Supply	0.38	0.67	0.90	1.08	1.42	1.80	2.18
Percent of total primary liquid fuels supply	1.8%	3.4%	4.6%	5.5%	7.1%	8.8%	10.4%
Total Crude Supply	15.24	14.76	13.83	13.92	13.76	13.86	14.02
Total Primary Supply	20.70	19.73	19.61	19.81	19.89	20.31	20.87

Source: Table 11 in the U.S. EIA's *International Energy Outlook*, 2009

Table 5: Alternative Fuels and U.S. Liquid Fuels Supply, 2006–2030

World Liquid Fuels Production (million barrels per day)							
	2006	**2010**	**2015**	**2020**	**2025**	**2030**	**Average Annual Percent Change, 2006–2030**
Biofuels	0.8	1.9	2.8	3.9	5.1	5.9	8.6
% of World	0.9%	2.2%	3.1%	4.1%	5.0%	5.5%	
Total World	84.6	86.3	90.6	95.9	101.1	106.6	1

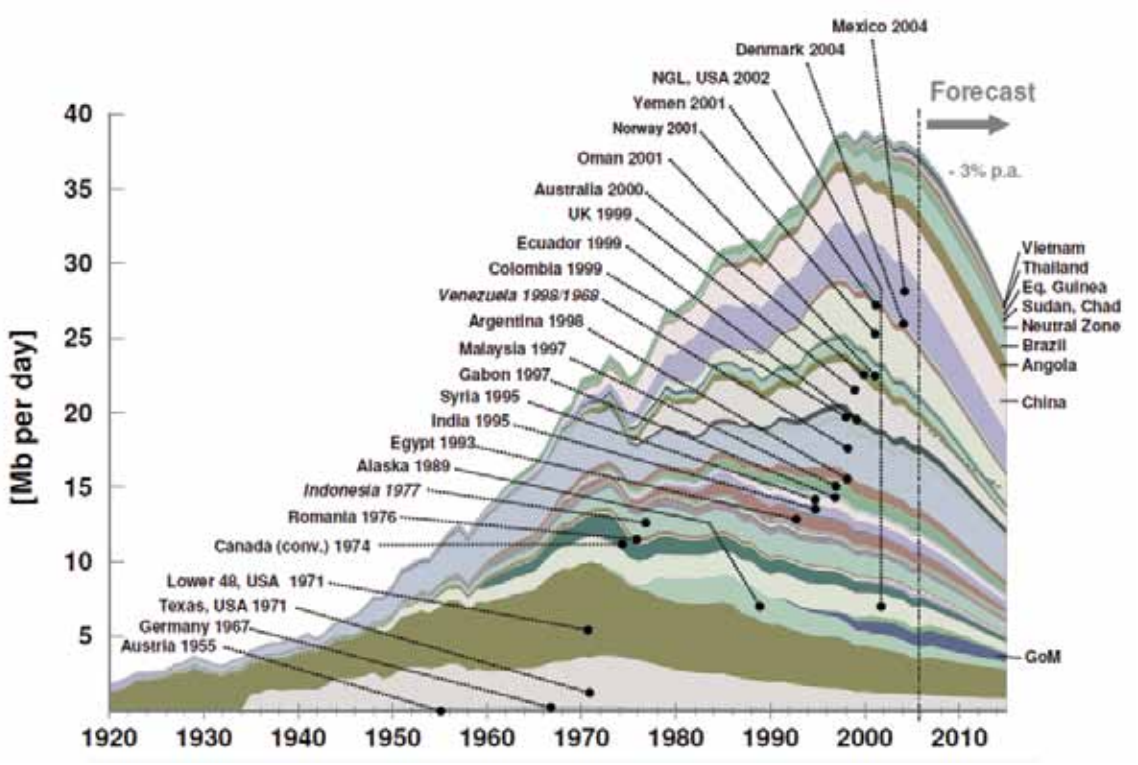
Source: Table 11 in the U.S. EIA's *International Energy Outlook*, 2009

Currently, estimations of worldwide peak oil production vary all the way from "already occurred" to "will not occur." Early predictions of worldwide peak oil targeted the 1990s and even the 1980s; there are experts who believe that it has just occurred in the last few years (Kenneth S. Deffeyes – 2005; Matthew Simmons [predicting in 2006] – 2008; Association for the Study of Peak Oil and Gas – 2005 and then revised to 2010; Ludwig-Bölkow-Systemtechnik GmbH – 2006[4]), but the majority opinion of proponents of a peak can be summarized as it will likely occur sometime in the next 25 years.

Conclusion

The one commonality among peak oil predictions is that you can only know when the peak will be after it has already occurred, but given advances in production technology, difficulties in accurate production estimation, or newly discovered reserves, a considerable amount of time might need to pass before even this aphorism comes true. One thing is certain—the potential for peak oil and its effects on the world economy should drive the development of new, comprehensive energy policies and alternative energy technologies.

Figure 5: Peak Oil Dates for Non-OPEC Nations (and Angola)



Source: Ludwig-Bölkow-Systemtechnik GmbH, 2007
Data: IHS 2006; PEMEX, petrobras ; NPD, DTI, ENS(Dk), NEB, RRC, US-EIA

[3] ABC.net.au, Peak Oil? http://www.abc.net.au/4corners/special_eds/20060710/.

[4] Crude Oil – The Supply Outlook, Ludwig-Bölkow-Systemtechnik GmbH, 2007. http://www.energywatchgroup.org/Oil-report.32+M5d637b1e38d.0.html.

Ask the Energy Expert

Proper Preparation Is the Key to Good Performance

Saint-Gobain Stresses Careful Planning as the First Step in Energy Efficiency

Dear Energy Expert:
Not only is your company a* Save Energy Now *LEADER, but it was named ENERGY STAR Partner of the Year two years in a row, and your plants have been recognized as Energy Savers and Energy Champions. What can my company do to be as successful?

Saint-Gobain is a global manufacturer and distributor of flat glass, building products, glass containers and high-performance materials.

With over 1,000 subsidiaries in more than 50 countries, it is the world's largest building materials company and a leading distributor of building products. Founded in 1665 and headquartered in Paris, Saint-Gobain had worldwide sales of $53 billion in 2009 and employs approximately 190,000 people.

Saint-Gobain Corporation, based in Valley Forge, Pennsylvania, is the holding company for the U.S. and Canadian-based operations of the global Saint-Gobain Group.

The company manufactures a range of building products, high-performance materials, and glass containers at more than 140 plants throughout North America. The company is also a distributor of building materials, with more than 160 outlets throughout the United States.

Background

Saint-Gobain has long adopted a corporate philosophy of energy efficiency that is demonstrated throughout the company, such as in the construction of energy efficient buildings and in making the plants that produce materials for those buildings consume energy more effectively while reducing related carbon dioxide emissions. The company even implemented a program to train contractors on energy efficient construction and explain how they can apply those techniques when constructing new residential facilities.

To date, six of Saint-Gobain's U.S. plants have participated in U.S. Department of Energy (DOE) Energy Savings Assessments (ESAs), with many of those plants formally being recognized as Energy Savers and Energy Champions for reducing their energy consumption a minimum of 7.5% since participating in an ESA. Saint-Gobain was also named the U.S. Environmental Protection Agency's ENERGY STAR Partner of the Year for the last two years. Saint-Gobain received the honor in 2010 because the company reduced its North American energy consumption 2.2% and lowered its carbon dioxide emissions by more than 70,000 metric tons.[2]

In November 2009, Saint-Gobain partnered with the DOE Industrial Technologies Program (ITP) to become a Save Energy Now LEADER and was one of the first companies to take the voluntary Pledge of reducing its energy intensity at least 25% over the next 10 years. As a LEADER, Saint-Gobain is increasing its energy efficiency target and is now eligible for priority access to ITP tools and resources for industrial energy efficiency.

Preparation is Key

As part of an overall strategy to improve energy efficiency, Saint-Gobain facilities are encouraged to specifically prepare for and participate in energy assessments. Proper planning helps ensure implementation of the recommendations that result from those assessments. Saint-Gobain shared some tips during the January 2010 Save Energy Now LEADER Webinar, led by Saint-Gobain's Energy Manager, Brad Runda.

Plan

The first step is to set aside some time to prepare for an energy assessment, whether it is a Save Energy Now ESA or Industrial Assessment Center-conducted assessment. Proper preparation will help to minimize the amount of downtime that may occur and will help to avoid a drop-off in momentum.

Prepare

Saint-Gobain believes that thorough preparation before an assessment will yield the maximum results from the assessment—including successful implementation. In order to optimize the time of an Energy Expert or Qualified Specialist during an assessment, Saint-Gobain recommends the following steps before the assessment commences:

[1] Saint-Gobain. Saint-Gobain at a Glance. http://www.saint-gobain.com/en/press/saint-gobain-glance. Visited 29 March 2010.

[2] ENERGYSTAR. Saint-Gobain: ENERGYSTAR Partner of the Year. http://www.energystar.gov/index.cfm?fuseaction=pt_awards.showAwardDetails&esa_id=3656. Visited 29 March 2010.

SAINT-GOBAIN

- **Safety Review**: Safety is the top priority for anything related to the plant. It remains the top priority before and during an assessment, so a safety review with people participating in the assessment is a must.
- **Internal Approval**: A key step is to receive internal approval for the people participating in this assessment. This is also a good opportunity for establishing goals and determining your measures of success during and after the assessment.
- **Confidentiality Agreement**: This is a fundamental requirement before any assessment. When signed, this will ensure that process-specific information and other sensitive information can be shared with the assessors, enabling them to have access to the information they need to do their job properly.
- **Fuel Consumption**: It is imperative to compile your natural gas and electricity bills over the last year (data for the past two years is even more helpful). These bills will provide the assessor with an accurate history of the plant's energy consumption and enable that assessor to identify patterns or notable changes in consumption. It is also beneficial to know where and how energy is consumed, as this helps those conducting cost benefit analyses. Being armed with these details will help when selecting which piece of equipment or system should be analyzed during the assessment.
- **Metering**: If available, submetering and load profile information are important to have on hand during an assessment and should be compiled before the assessment begins. An energy manager must determine and prepare locations for metering if the plant does not already have it. It is further recommended to work with the person conducting the assessment to determine where it should go.
- **Equipment and Processes**: Energy managers should know where equipment is located; blueprints and diagrams are helpful for this. Energy managers should also compile a list of equipment and its purpose, as well as original equipment manufacturer specifications. Further, the energy manager should know process requirements and communicate any needs of the plant to the energy assessor. Understanding the plant's needs and goals will help the energy assessor identify energy efficiency improvements or process changes that can help fulfill those criteria.

Corporate Buy-In

When trying to receive corporate buy-in for implementing energy efficiency projects, it is important to emphasize how the company and the individuals in charge will benefit. The energy assessor may provide suggestions for potential financing, but it is important to check other places for more information to really understand what options are available to implement the project. It is also important to develop a strategy for presenting recommendations on which projects should be implemented, be it prioritized by cost savings or return on investment. "Low-hanging fruit" opportunities should always be included, because they have an immediate payback and motivate staff to look for additional opportunities.

Capital Budgets

An energy manager needs to understand how his or her company's budgeting process works to be able to utilize capital and ensure funding is set aside for energy efficiency projects. If an assessment is pending during the time budgets are being developed, a placeholder can added to reserve funds for implementation. It is also important to check the status of the capital budget periodically to determine if there are project offsets or unspent money that can be allocated to fund some of the energy efficiency improvements identified during the assessment.

Staff

Determine correct participants and their roles in the process. Having the right people participate in the assessment is the key to success. It is important to receive a commitment from both personnel and their managers before getting started to ensure a successful assessment.

Conclusion

Saint-Gobain's commitment to energy efficiency has been showcased through the organization's voluntary commitment to reduce its energy intensity 25% over the next 10 years through ITP's Save Energy Now LEADER program. The company's proven approach to improving the odds of a successful assessment and implementation can help others be successful as well.

Ask the Energy Expert is an ongoing column with the intent of providing information and solutions for industry's most pressing questions. This issue's Energy Expert is **Brad Runda (Manager, Energy) at Saint-Gobain.**

Save Energy Now LEADER Dow Chemical Delivers Webcast on Superior Energy Performance

On March 4, 2010, Dow Chemical teamed up with the Industrial Technologies Program to deliver a Webcast on Superior Energy Performance—an industry-driven plant certification program that is pending American National Standards Institute (ANSI) accreditation. The Summer 2010 issue's *Ask the Energy Expert* column will feature energy-saving recommendations by Joe Almaguer, global energy efficiency leader at Dow.

Blue Ribbon Corner

Save Energy Now 2010 Energy Champion and Energy Saver Award Recipients

The U.S. Department of Energy's Industrial Technologies Program (ITP) is proud to announce this list of companies being recognized as 2010 *Save Energy Now* Energy Savers and Energy Champion Plants.

ITP recognizes U.S. manufacturing plants for implementing recommendations identified during *Save Energy Now* energy assessments and achieving significant energy savings.

For more information, please visit http://www1.eere.energy.gov/industry/saveenergynow/recognition_guidelines.html.

Energy Savers

The following companies achieved more than 75,000 MMBtu total energy savings or more than 7.5% total energy savings.

3M – Decatur, AL Plant
Airstream, Inc. – Jackson Center, OH Plant
Alexandria Extrusion
Ampacet Corporation – Heath, OH Plant
Anoplate Corporation
Baxter BioScience – Thousand Oaks, CA Plant
Bobalee Hydraulics
Bollinger Shipyards – Amelia, LA Plant
Boyd Technologies
Brown Corporation of Moberly
Caterpillar Inc. – East Peoria, IL Plant
Corn Plus Ethanol
DeepSea Power & Light
Dynaburr
E.F.S., Inc – Rockmart, GA Plant
EGS Electrical Group – Houston, TX Plant
EGS Electrical Group – Sola – Rainsville, AL Plant
E-J Enterprises
Emerson Power Transmission – SealMaster – Morehead, KY Plant
English American Tailoring Co.
ESCO Turbine Technologies – Chittenango, NY Plant
FCH Enterprises Inc.
Flinchbaugh Engineering, Inc.
Forte Power Systems
Fresenius – Ogden, UT Plant
Fusite – Cincinnati, OH Plant
General Plug & Manufacturing Co. – Oberlin, OH Plant
Geyser Peak Winery
Goodyear Tire & Rubber Company – Topeka, KS Plant
Goodyear Tire & Rubber Company – Lawton, OK Plant
Graham Packaging Pet Technologies, Inc – Fremont, OH Plant
Graphic Packaging – Solon, OH Plant
Greif – Morgan Hill, CA Plant
Greif – Florence, KY Plant
Greif – LaPorte, TX Plant
Hague Quality Water
Heidenhain Corporation– Santa Barbara Operations
Hercules Paper Technologies – Portland, OR Plant
Hoosier Magnetics, Inc.
Hormel Foods – Clougherty Packing Company
Hormel Foods – Rochelle, IL Plant
HPM Building Supply
IBM Corporation – Pouhgkeepsie, NY Plant
Ideal Snacks Corporation
Illinois Tool Works – Lake Geneva, WI Plant
Interstate Paper LLC – Riceboro, GA Plant
Jabil Circuit – St. Petersburg, FL Plant
Johnson Controls Incorporated – Red Oak, IA Plant
Kawneer
Keller Crescent – Portland, CT Plant
Kent Feeds, Inc. – Beardstown, IL Plant
Link Manufacturing, Ltd.
Marlite – Dover, OH Plant
Medical Device Technologies
Mennie Machine Company – Mark, IL Plant
Michael Foods – Klingerstown, PA Plant
Mid-South Electronics
Munters – Amesbury, MA Plant
National Cart Company – St. Charles, MO Plant
OMNOVA Solutions – Calhoun, GA Plant
O'Neal Steel – Waterloo, IA Plant
Owens Corning – Roofing – Houston, TX Plant
Parker Hannifin Corporation – Holly Springs, MS Plant

PGT Industries – North Venice, FL Glass Plant
PGT Industries – North Venice, FL Assembly Plant
Plastic Parts, Inc
Plymouth Tube Company – Eupora, MS Plant
PMRS, Inc.
Rathbone Precision Metals, Inc
Rigid Pak Corporation
Roper Pump Company
Rudolph Foods Company – Lawrenceville, GA Plant
Rusken Packaging – Cullman, AL Plant
Schindler Elevator Corporation – Gettysburg, PA Plant
Schreiber Foods, Inc. – Carthage, MO Plant
Schreiber Foods, Inc. – Mount Vernon, MO Plant
Sherwin-Williams Minwax – Flora, IL Plant
Simi Winery
Snyder Industries Inc. – Philippi, WV Plant
Superior Manufacturing & Hydraulics, Inc.
Temple – Inland – Binghamton, NY Plant
Temple-Inland – Utica, NY Plant
Tervis Tumbler
Texon Polymer Group
The Crowell Corporation
The Pepsi Bottling Group, Inc. – Harrisburg, PA Plant
Tronox, Inc – Hamlinton, MS Plant
United States Steel Corporation – Fairfield Works
VT Industries – Bryan, TX Plant
W. R. Grace and Company – Irondale, AL Plant
Wabash Alloys LLC
Warren Achievement Center
Weyerhaeuser (NORPAC) – Longview, WA Plant
WhiteWave Foods, Inc – Jacksonville, FL Plant
Whitmore Group – Annapolis, MD Plant
ZF Services North America, LLC.

Energy Champions

The following companies achieved more than 250,000 MMBtu total energy savings or more than 15% total energy savings.

Alco High-Tech Plastic Inc.
American Axle & Manufacturing – Detroit Gear and Axle
American Textile Company – Duquesne, PA Plant
Appleton Papers, Inc – West Carrollton, OH Plant
Ashland Hercules Water Technologies – Macon, GA Plant
Bollinger Shipyards Inc. – Lockport, LA Plant
Bracalente Manufacturing Company, Inc.
Carlisle Industrial Brake & Friction – Logansport, IN Plant
Century Packing Corp
Chatsworth Products Inc. – Georgetown, TX Plant
Clos Du Bois
Daviess County Metal Sales Inc.
Diamond Crystal Brands – Duluth, GA Plant
Dogfish Head Craft Brewery
EGS Electrical Group – Stephenville, TX Plant
Emerson Power Transmission – Maysville, KY Plant
Endot Industries, Inc. – Greeneville, TN Plant
ENKEI Florida Inc.
Fairfield Aluminum Casting Company
FUJIFILM Hunt Chemicals USA Inc. – Dayton, TN Plant
GE – Arecibo, PR Plant
Gerdau Ameristeel – Calvert City, KY Plant
Gerdau Ameristeel – Knoxville, TN Plant
Green Point Nursery
Hamilton Sundstrand – Miramar, FL Plant
Hart Associates
Hirsh Industries – Dover, DE Plant
ILC Dover Inc.
Jabil Circuit – St. Petersburg, FL Campus
Joy Mining Machinery – Franklin Manufacturing Operations
Kraft Foods – Campbell – Campbell, NY Plant
Mansfield Industries Inc.
Mid-South Metallurgical
Morrill Motors, Inc. – Erwin, TN Plant
Multifilm Packaging Corporation
Nalco Company – Scott, LA Plant
Northern Star Industries – BOSS Snowplow Plant
Northern Star Industries – Systems Control Plant
Ohmart/VEGA Corporation
Oldcastle Glass – Albertville, MN Plant
Penn-Union Corp.
Poland Sand & Gravel
Polymer Technologies Inc.
Presrite Corp
R.C.A. Rubber Co.
Red Ball Oxygen
Rio Grande Valley Sugar Growers – WR Crowley Sugar House
Ryobi Die Casting (USA), Inc – Shelbyville, IN Plant
Sanderson Pipe Corporation – Sanderson, FL Plant
Southern States LLC
The Coca-Cola Company North America – High Springs, FL Plant
Trex Hawaii, LLC
United Machine and Foundry
Universal Protective Packaging, Inc – Mechanicsburg, PA Plant
vonGal Corporation
William A. Schmidt & Sons, Inc.

International

James Quinn, international coordinator at the U.S Department of Energy's (DOE's) Industrial Technologies Program (ITP), and Dr. Sachin Nimbalkar of Oak Ridge National Lab conducted **two energy efficiency workshops and three plant visits in India**, as part of ITP's collaboration with the Confederation of India Industry. While there, Mr. Quinn and Dr. Nimbalkar presented at two *Save Energy Now* Workshops, attended by various Indian businesses and industries. Topics included utilizing DOE tools, training, and information products as well as learning about the newest U.S. energy-saving technologies. The plants visited had previously received energy audits and assessments, but Mr. Quinn and Dr. Nimbalkar were able to follow up and identify further potential improvements in energy efficiency. India has one of the fastest growing energy economies in the world and about half of the country's energy is used by industry. Many energy-intensive industries in India plan to increase capacity by 5–10 times over the next 10 years, emphasizing the opportunity in pursuing joint activities between India and DOE for a global clean economy.

Mr. Quinn will also be attending the **U.S.-China Energy Efficiency Forum** and ancillary meetings to explore collaborative efforts between the United States and China at the end of May. This is part of the *Energy Efficiency Action Plan* established in November 2009 by President Obama and President Hu Jintao of China to improve the energy efficiency of buildings, industrial facilities, and consumer appliances.

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 Web site** at http://www1.eere.energy.gov/financing/ to learn about the EERE funding and award process, types of EERE financial assistance, and how to apply.

The Industrial Technologies Program (ITP) is dynamic and offers many opportunities and activities for manufacturers who want to reduce their energy use and improve productivity. Competitive solicitations are the principal mechanism used by ITP to contract for cost-shared research and development. Solicitations reflect the priorities of the program and selection of projects follows merit-based criteria that emphasize projected energy, environmental, and economic benefits.

Visit the **ITP Solicitations page** at http://www1.eere.energy.gov/industry/financial/solicitations.html for active and future solicitations.

Training Opportunities

June 8–10, 2010

Specialist Qualification: Process Heating [Morgantown, West Virginia]. This 2½-day workshop has been developed to qualify industry professionals on the use of the Process Heating Analysis and Survey Tool (PHAST). Contact: Kathleen Cullen; 304-293-2867 x5426; kathleen.cullen@mail.wvu.edu.

June 15–16, 2010

Advanced Management of Compressed Air (Level 2) [Milpitas, California]. This intensive 2-day workshop provides in-depth technical information on troubleshooting and making improvements to industrial compressed air systems. Contact: Frank Moskowitz; 480-563-0107; fmoskowitz@drawproservices.com.

June 22, 2010

Fundamentals of Compressed Air (Level 1) [South Burlington, Vermont]. 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: Peter Wilhovsky; 888-921-5900 x1328; pwilhovsky@veic.org.

June 24, 2010

Fundamentals of Compressed Air (Level 1) [Rutland, Vermont]. 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: Peter Wilhovsky; 888-921-5990 x1328; pwilhovsky@veic.org.

August 3–5, 2010

Specialist Qualification: Steam Systems [Morgantown, West Virginia]. This 2½-day Steam System Specialist Qualification is for steam service providers who are interested in becoming proficient in using the BestPractices Steam tools. Contact: Kathleen Cullen; 304-293-2867 x5426; kathleen.cullen@mail.wvu.edu.

August 25, 2010

Pump Systems Management [San Diego, California]. This 1-day workshop discusses performance problems encountered in everyday applications and presents the Pump System Assessment Tool (PSAT). Contact: Bonnie Moreno; 619-857-5391; ymoreno@semprautilities.com.

August 31–September 1, 2010

Advanced Management of Compressed Air (Level 2) [South Burlington, Vermont]. This intensive 2-day workshop provides in-depth technical information on troubleshooting and making improvements to industrial compressed air systems. Contact: Peter Wilhovsky; 888-921-5990 x1328; pwilhovsky@veic.org.

Beginning September 13

Fundamentals of Compressed Air Systems,* WE *(Web Edition). The Compressed Air Challenge is pleased to announce the next round of the Fundamentals of Compressed Air Systems *WE*, beginning September 13, 2010. 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. Please visit the Compressed Air Challenge Web site, http://www.compressedairchallenge.org/, for online registration.

For more information on training opportunities offered by the Industrial Technologies Program, as well as a current calendar of available training sessions, please visit http://www1.eere.energy.gov/industry/bestpractices/training.html.

Look for Us...

ITP Calendar of Events

June 2010

13–16: Edison Electric Institute Annual Meeting

13–16: International District Energy Association 101st Annual Conference and Trade Show

15–16: West Coast Energy Management Congress 2010

27–29: Electrical Apparatus Service Association 2010 Convention

Industrial Technologies Program Contacts

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

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