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BRIEF

# ENERGY EFFICIENCY

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# ENERGY AS A DIRECT COST

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More companies are finding that folding energy into overhead is no longer necessary. Applications exist today for modeling energy usage in processing plants, and reaching across corporate networks to track energy as a direct cost of products. The energy savings can be enormous.

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By [James R. Koelsch](#), Contributing Editor

**A** fundamental tenet of process control is that you must be able to measure a variable before you can control it. So, given the volatility of energy costs these days, it's no wonder that even energy producers like Valero Energy Corp. ([www.valero.com](http://www.valero.com)), purportedly North America's largest independent refiner and marketer of petroleum products, based in San Antonio, Tex., are investing in automation and software for measuring and analyzing their own energy consumption. Rather than burying energy as a fixed cost in overhead, these and other companies are using tools available today to treat

energy as a direct cost of their products and services. With this information, they can manage their energy consumption as they would their raw materials, or any other factor of production.

The savings can be enormous, especially in the process industries where energy can be as much as 35 percent of operating costs. Valero, for example, reports that it cut its energy consumption by \$120 million in the first year alone after tracking and analyzing its energy costs with the Manufacturing Integration and Intelligence (MII) application from SAP AG

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## Energy as a Direct Cost

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**CLICK HERE** to start your energy savings journey today.

(www.sap.com), which has U.S. headquarters in Newtown Square, Pa. According to a spokesman, Valero saw a total project payback in less than one month from energy optimization.

Using a distributed network connecting the company's 15 refineries and 10 ethanol plants across North America, MII collects and displays key performance indicators from 20,000 continuous data streams through SAP's enterprise resource planning (ERP) software. The granularity of the data allows drilling down through the eight or so levels of the organization to view details on energy consumption at a specific location or process unit. Because the data is available in near real time, it is fresh enough for executives review the data every morning to make decisions.

Besides monitoring gas, steam and electricity usage, Valero Energy can also model the effect that proposed changes to its manufacturing process will have on specific operations. Consequently, the engineering staff can optimize operating parameters such as tank temperatures and pressures to lower total energy consumption.

Such visibility into energy consumption is the result of three trends, according to Scott Bolick, SAP's vice president of sustainability solution management. First has been a greater use of meters among users to measure actual power consumption at the point

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## Energy as a Direct Cost

of use. Because the technology has matured to the point where its cost of implementation has declined, users find justifying them much easier, especially as energy costs continue to rise.

The second trend supporting greater visibility is the development of computing technology that can analyze thousands of metering data points in either real time or near real time. For an example, Bolick points to the Hana in-memory analytical technology that SAP introduced a few years ago as a combination of powerful software and SAP partner hardware used to power the MII application. By storing data in memory, rather than reading it from disk, the appliance processes and analyzes information much faster.

“Analyses that used to require days or weeks to process now are possible to perform within seconds or minutes,” says Bolick. In a test that SAP conducted at a utility, the technology was able to search over 11 million customer records within a half second, he says.

The third trend is an evolution in the relationship between the utilities and industrial consumers. “It is no longer just about selling energy,” explains Bolick. “Utilities are becoming energy service providers that want to collaborate with their top commercial consumers in order to be able to balance the supply and demand and meet any regulatory constraints that they may have.” 

# TRENDS 2012: ENERGY EFFICIENCY, USABILITY AND INTEGRATION



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2012 promises to become a very exciting year in all sectors—economic, technical and political—in Germany and around the world.

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By [Martin Buchwitz](#), Editor in Chief of SPS-Magazin in Germany

**B**ut one thing seems to be clear: Competitive pressure on companies will increase.

In its role as global market leader in automation, Siemens AG ([www.siemens.com](http://www.siemens.com)) is something like a bellwether for the economic development of the industry. At its annual press conference at the end of January, the company called itself “reserved” concerning the economic development for 2012. They spoke of a “difficult economical environment.” On the other hand, there was still good news regarding incoming orders. China, for example, is increasing automation because of financial reasons, which offers more potential for German

machine builders and automation providers (see “Chinese Automation Investment on the Rise”).

From the technical point of view, there are three basic developments that will be determining factors in the next months and years: energy efficiency, usability and integration. All three are closely related to cost, even if this isn’t always obvious.

These issues aren’t new, but what is new, is their increasing meaning. Concerning energy efficiency, cost factors and environmental protection stands in the






continued

## Trends 2012: Energy Efficiency, Usability and Integration

foreground, especially in view of increasing energy costs. Usability and integration are driven by the growing complexity of automation. To make these issues more controllable and affordable, both must be simplified.

In the matter of integration, marketing buzzwords aren't enough anymore. Usability experts have to be called in and existing interfaces have to be omitted in favor of continuous transparency. No one can convince me credibly why it should be impossible today to treat all automation functions in engineering in a simple way right from the beginning. After 40 years of control engineering, it's good if there is real competition. Monopoly-like positions are always bad for customers.

It's time for users of control engineering to demand real integration and tools that are easy to handle where they aren't available yet. Customers have power and competition stimulates business. We are excited to see what markets, trends and techniques this year will bring. 

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# POWER INDUSTRY REFOCUSSES, FACES “NEW NORMAL”



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There's never a lull in the challenges facing the power industry. Coal-fired power plants remain targets of the Greens. Nuclear power incurs more negative publicity via the earthquake-induced nuclear-plant crisis in Japan.

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By [C. Kenna Amos](#), Contributing Editor

**F**or the foreseeable future, renewables will require government subsidies to stay alive. And the entire industry attempts to cope with “new normal” operations.

Natural gas presents its own challenge. Its cost has dropped and stayed low, states Harry Forbes, a senior analyst with Dedham, Mass.-based ARC Advisory Group ([www.arcweb.com](http://www.arcweb.com)).

“This is a different expectation for the industry. So, now, natural gas competes pretty favorably for new facilities.” An example Forbes gives is a combined-cycle plant—in which

a gas turbine generates electricity and steam derived from the turbine's waste heat generates more electricity through a steam turbine—having very high thermal efficiency, a small areal footprint and about half of the carbon emitted by coal-fired power plants.

The U.S. Department of Energy's (DOE's) Energy Information Administration concurs with Forbes: “Natural gas, used for about 9 percent of electric utility generation, is the preferred energy source for new generating capacity.” For example, electricity-generating giant American Electric Power (AEP) ([www.aep.com](http://www.aep.com)), in Columbus, Ohio, owns



## Power Industry Refocuses, Faces “New Normal”

approximately 38,000 megawatts (MWs) of generating capacity. It plans to build a new 580 MW gas-fired unit in Ohio and convert a coal-fired unit on the West Virginia-Kentucky border to a 640 MW gas-fired unit.

The smart-grid concept also refocuses power generation. “It [the smart grid] has taken a lot of attention off the power plants. Utilities [had] focused on transmission and distribution (T&D) because there is a wave of money the federal government is throwing at it,” Forbes says.

DOE defines the smart grid as an automated, widely distributed energy delivery network characterized by a two-way flow of electricity and information—one that will be capable of monitoring everything from power plants to customer preferences to individual appliances. “It [the smart grid] incorporates into the grid the benefits of distributed computing and communications to deliver real-time information, and enables the near-instantaneous balance of supply and demand at the device level,” DOE states.

### The “new normal”

And, generally, regarding supply and demand, owners/operators now make plans for the “new normal,” Forbes says. For what do they plan? “That their loads may be lower and, thus, old plants may not be as important.” He notes demand drop comes for energy-intensive industries such as primary metals and chemicals because they’re less robust.

Mainly, new normal is an industrial energy-intensive issue and it’s about money, Forbes believes. Questions needing answers: Which plants to retire, or which plants to replace? If new or replacement plants, combined cycle is the most popular, he comments. But for coal-fired power plants that combined generate more than 56 percent of utility power, according to DOE, “these are much more long-term and more difficult to build,” he says.

Why so? “It’s partly plant complexity and partly regulatory,” Forbes says. To deal with current U.S. Environmental Protection Agency air-pollution-control regulatory challenges






## Power Industry Refocuses, Faces “New Normal”

for coal-fired plants, AEP plans to close plants and retire units.

### Underestimated impact

“The cumulative impacts of the EPA’s current regulatory path have been vastly underestimated, particularly in Midwest states dependent on coal to fuel their economies,” said Michael G. Morris, AEP chairman and CEO, in a June 9, 2011, press release. “We have worked for months to develop a compliance plan that will mitigate the impact of these rules . . . but because of the unrealistic compliance timelines in the EPA proposals, we will have to prematurely shut down nearly 25 percent of our current coal-fueled generating capacity, cut hundreds of good power plant jobs and invest billions of dollars in capital to retire, retrofit and replace coal-fueled power plants.”

Meanwhile, nuclear loses ground. “The prospects for new nuclear builds are significantly reduced. There will still be some, but I don’t think very much,” Forbes predicts. In North America, that may be due to the recent earthquake-induced fears following the Fukushima Daiichi plant crisis in Japan, he believes.

With all this industry flux, what challenges the industry most? “They have to figure out how to give better service, higher quality service effectively, when there is less demand,” Forbes says. And that means changing their culture—and also integrating what the industry calls distributed energy resources, he explains. That also means turning from focusing totally on grid T&D. 

» Rust Belt Plant goes green, saves \$1.3M annually



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[CLICK HERE](#) to read how Siemens invested over \$35M in their own 104 year old American manufacturing plant, and is saving \$1.3M each year in energy costs.

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# FROM WASTEWATER TREATMENT TO RESOURCE RECOVERY



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EBMUD is the first U.S. water and wastewater utility to sell the excess electricity, produced solely from waste material, back to the grid.

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By [C. Kenna Amos](#), Contributing Editor

In the municipal water/wastewater treatment sector, budgets remain a challenge, says Eileen O'Neill, deputy executive director of the Alexandria, Va.-based Water Environment Federation (WEF, [www.wef.org](http://www.wef.org)).

Even so, "we're seeing people investing in technologies," O'Neill says. One such investor is the Oakland, Calif.-based East Bay Municipal Utility District (EBMUD, [www.ebmud.org](http://www.ebmud.org)). Its wastewater treatment plant serves approximately

650,000 people in an 88 sq. mile area of Alameda and Contra Costa counties along the San Francisco Bay's east shore.

EBMUD meets the new definition WEF gives to what once was a municipal wastewater treatment plant (WWTP): That's a "water-resource recovery facility," which produces clean water and recovers nutrients (e.g., phosphorus and nitrogen), as well as produces electricity

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## From Wastewater Treatment to Resource Recovery

from municipal wastewater and other wastes.

On April 3, 2012, EBMUD announced operation of a state-of-the-art 4.6-megawatt turbine that supplements three existing engines. Combined, all four can produce electricity to meet the demands of more than 13,000 homes. “We’ve turned wastes into commodities. The same materials that, once, no one wanted to touch now have become so valuable everyone wants them,” said David Williams, EBMUD director of wastewater, in a public statement.

Over the past 10 years, the utility has expanded its collection of septage waste. It also began accepting items like restaurant grease, cheese waste, chicken blood and winery wastewater from throughout central and northern California.

Williams claimed in the public statement that EBMUD is the first U.S. water and wastewater utility to sell the excess electricity, produced solely from waste material, back to the grid. As WEF’s O’Neill adds, “We’re on the cusp of a revolution here.” 

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# ONLINE ENERGY SAVINGS ESTIMATOR FOR MACHINE DRIVE TRAINS

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Siemens Industry has introduced an online Energy Savings Estimator tool that allows customers using drives, motors, couplings and gearboxes to estimate potential energy savings of upgrading components across their entire drive train.

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By [Renee Robbins Bassett](#), Managing Editor

The Drive Technologies division of Siemens Industry, Inc. announced what it's calling an industry first: an online Energy Savings Estimator tool that allows customers using drives, motors, couplings and gearboxes to estimate potential energy savings across their entire drive train.

"We believe that our Energy Savings Estimator is an industry first, providing customers with an easy method of understanding the potential savings that upgrades may offer

to their existing drive train systems – all through one easy to use Web site," says Doug Keith, president of the drive technologies division of Siemens Industry, Inc.

Siemens Energy Savings Estimator only requires the end user to submit existing data points about their current system including, for example, the application (fans, compressors or pumps), horsepower, motor speeds, reduction stages for gearboxes, etc. Once the operating profile is put in, the tool



## Online Energy Savings Estimator for Machine Drive Trains

### » TXI Aggregates reduces their energy costs with VFD's




» TXI Aggregates is a leading supplier of cement, aggregate, and consumer building materials in Texas, Louisiana, Oklahoma, and California. When faced with increased energy prices and energy supply concerns, they began a companywide initiative to enhance efficiency and reduce overall operating costs, focusing on systems that don't always operate at full capacity.

**CLICK HERE** to read about how TXI improved system reliability, efficiency, and profitability.

evaluates the potential for energy savings in kilowatt hours (kWh), dollars, CO2 emissions, and the overall return on investment for the recommended solution.

"A significant opportunity for industry energy efficiency exists through the implementation of control, automation and drive technologies, and according to the Department of Energy, industry consumes 70 percent of all energy consumed in the U.S. With energy efficiency initiatives, U.S. manufacturers could reduce energy consumption by as much as 30 percent, also resulting in operational efficiencies, improved productivity and a strong return on investment," adds Keith.

The program also offers "real world savings" approximations to help users understand what their estimated savings means in terms of sustainable operations, such as "488,000 kWh could fully charge 40,800 electric cars, allowing them to travel 1,600,000 emission-free miles." 

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