



ENERGY STRATEGY MAKES A DIFFERENCE

Learn how to use energy efficiency to optimize performance and sustainable production through strategic planning, informed analysis, and cutting-edge automation and control technology.

By Marcia Walker and Phil Kaufman, Rockwell Automation

» Forecasts show world electricity demand growing 3.2% annually from 2006 to 2015, with U.S. manufacturers alone spending more than \$33 billion per year on electricity. Similar demand exists for oil, natural gas and other energy sources. In response to these burgeoning demands, local and federal governments and utilities are promoting initiatives to reduce energy consumption. Plans are moving forward for new power generation sources to resolve instability and bottlenecks in the nation's power grid.

Nevertheless, near-term supply issues remain, and that means manufacturers must take energy-efficiency measures to reduce consumption and lessen demands on the grid. This also means reducing operating costs and adding dollars to the bottom line.

Indeed, it's becoming socially responsible and financially essential for manufacturers to identify energy-efficient solutions for their plants. However, identifying these potential savings can be daunting. Manufacturing processes are interlinked, and plant-floor layouts have grown larger and more complex to meet changing market demands.

This is where energy-management solutions and services for assessing, monitoring, reporting and optimizing energy can help manufacturers structure and manage an effective energy-savings program. This approach helps make operations cleaner, more energy efficient and more competitive.

Traditionally, industrial energy consumption has been seen one-dimensionally as an unavoidable, unmanageable cost of doing business. However, the most effective energy-management strategy is one that adopts a three-dimensional approach — using *less* energy, more *cost-effective* energy and a more *optimized* approach to consumption and supply.

The core of this strategy is to understand where, when and how much energy is being consumed across the enterprise, and then using this knowledge to create long-term savings.

Using Less Energy

While many companies collect and profile energy data, often they use manual processes that are unreliable and time-consuming. Smart, automated devices can give users

better data and, in turn, better power management. This can include devices installed in the power flow at the point in which that power is converted to mechanical energy.

Before implementing the required energy-management technology and underlying infrastructure, companies can benefit from an assessment of overall consumption to identify potential savings. This analysis allows companies to monitor and review all incoming energy sources. General benchmarks can help, but local conditions — such as size of the plant, degree of automation and climatic conditions

Cheaper Energy

Companies also can use cheaper energy by managing where, how and when energy is used. They can harness it when it's least expensive, such as during off-peak times.

By developing an integrated energy-management program based on accurate consumption and spending patterns and demand profiles, companies can calculate power consumption costs among various production lines. Armed with more accurate information about actual production costs, managers can make more intelligent business decisions.

ELECTRIC MOTORS ARE ONE KEY AREA OF FOCUS FOR REDUCING ENERGY CONSUMPTION.

— are essential to understand a plant's specific potential.

One key area of focus for reducing energy consumption is on electric motors, because they drive most production output and consume the most electricity. This is where advanced motor management solutions can deliver huge results. For example, power-optimization tools — such as variable-frequency drives (VFD), energy-efficient motors and gears, motor controllers and software — all can deliver immediate, measurable bottom-line savings.

In any manufacturing process that requires less than 100% of designed speed, manufacturers should consider integrating VFDs for both low- and medium-voltage applications. They can help significantly reduce energy costs, and, when properly applied, help eliminate valves, increase pump-seal life, reduce power surge during start-up, and contribute to a more flexible operation.

A monitoring program is essential. It can include a network of digital power-monitoring devices that capture and communicate power-consumption information. The devices measure electrical parameters associated with a specific bus in a facility's electrical distribution system. Plant managers can gather information on power consumption in different areas of their plants, on specific machines (such as refrigeration compressors), and even on individual product lines.

Each department is seldom aware of its consumption on a daily, weekly or even monthly basis. By simply metering consumption, manufacturers can identify small opportunities for improvement to provide a significant impact on energy usage, resulting in immediate financial savings. In addition to usage data, managers have access to power-quality information that can improve productivity and lengthen equipment life, further enhancing profits and efficiency.

>> How the 'Greenprint' Can Help

Building on a foundation of ongoing assessments and monitoring, manufacturers can leverage a patent-pending approach to energy management from Rockwell Automation to optimize energy use. The seven pillars of the "greenprint" can help manufacturers make the transformation from passive energy users to strategic managers of their energy resources.

The following methodology takes an "inside-out" approach and helps enable manufacturers to use their existing automation and power-control investments to begin saving energy more effectively, and more intelligently investing it.

Facility Monitoring: Understand facility-level energy consumption to make better equipment run-time decisions.

Production Monitoring: Understand machine-level energy consumption of the plant floor in real time.

Capturing Energy on the Production Bill of Ma-

terials: View energy as a manageable input that can be documented on the production bill of materials.

Modeling: Use modeling and simulation solutions that factor in energy as a variable for optimizing profitability.

Controlling: Enable configurable automated optimization of production with energy as a variable.

Responding: Enable response to external market factors to optimize according to real-time supply.

Scorecarding: Extend the infrastructure to provide energy scorecards and optimize the supply chain with energy as a consideration.

For more information, visit www.rockwellautomation.com/go/tjsustain to download the white paper, "Industrial Energy Optimization: Managing Energy Consumption for Higher Profitability."

A major advantage of a power-monitoring system is its ability to capture and log real-time data and events via a high-speed control or information network over long time periods. If managers detect consistent differences in energy usage across departments, among shifts, or between plants with the same product lines, they can analyze the operation to see how lower energy usage might be achieved.

A revenue-accurate power monitor also is useful as a backup system to verify billing statements issued by electric utilities.

Energy-management software allows companies to model their energy profiles by:

- Measuring peak demands and quality parameters.
- Determining demand patterns.
- Correlating energy consumption to weather patterns.
- Aggregating loads.
- Calculating energy costs by business group, department or site.

Once managers identify and chart energy models of loads and trends, the possibilities are endless for manufacturers to maximize energy savings.

Case in point: One leading food and beverage manufacturer quickly found that negotiating the lowest electricity rate required precise information about its power-usage patterns, such as peak power demand, time of peak demand, and how often its plants draw power at the maximum rate. Armed with load-profile data compiled from a power-monitoring system, the company was able to renegotiate its agreement with its utility — reducing its annual energy costs by up to 10%.

Optimize Energy

The third, dimension of an effective energy-management strategy with the most financial impact is *optimizing* energy use. This helps achieve production goals in the least expensive, most profitable way. In other words, manufacturers can actively manage energy as one of many inputs to the overall production equation. Such a sophisticated approach is impossible if energy is viewed simply as plant overhead.

Once manufacturing energy-consumption data is stored and analyzed, managers can see clear trends of how energy has been used among various historical events, such as a product cycle or batch. Capturing that knowledge provides immediate benefit, and promotes future improvement.

Forward-thinking manufacturers are beginning to work toward programs to tie energy-consumption requirements empirically to the production bill of materials. The goal is to make more proactive operating decisions and better manage energy investments to generate a greater return.

For example, by knowing that certain batches require more energy, manufacturers can move those batches outside peak windows. In addition, unit-level energy-consumption information becomes valuable input to a company's sustainability scorecards and other reporting mechanisms.

Once managers have insight into how much energy is

THE POSSIBILITIES ARE ENDLESS FOR MANUFACTURERS TO MAXIMIZE ENERGY SAVINGS.

required to run a specific production cycle, they can leverage production-simulation software tools to analyze a range of input variables. They can assess peak and off-peak energy costs, raw material costs, labor and projected emissions. They also can pretest "what-if" scenarios to see how production outputs and costs will change as a result of modifications.

Being able to "see" a problem often gives additional meaning to information derived from the data, and in turn leads to proper corrective actions. Armed with this insight, manufacturers can see how energy consumption affects production capabilities and begin to make more strategic energy-management decisions.

Energy Costs are Controllable

While manufacturers have large energy demands, they also have large opportunities for savings. Manufacturers can take control of energy costs.

The bottom line is: Energy costs are controllable. The key is identifying energy-management goals, developing a corresponding strategy, and putting technology in place that enables manufacturers to accurately monitor, analyze and control energy consumption and quality. □

Are you a best-in-class manufacturer in terms of energy management and sustainable production? Complete Aberdeen Group's short online analysis, and you'll get a personalized scorecard showing how you stack up, plus a free copy of their Energy Management Report. Go to www.rockwellautomation.com/goltjenergy.

Rockwell Automation Energy Efficiency Solutions

www.rockwellautomation.com/go/tjsavings

Rockwell Automation Sustainable Production Solutions

www.rockwellautomation.com/go/tjsustain