New approaches to asset management yield big energy savings

Intelligent use of control systems can maximize the energy efficiency of industrial equipment by, among other things, making sure equipment runs only when needed to support plant operations.

THERE'S WIDESPREAD EVIDENCE—in the form of numerous analyst reports, articles, and case studies—that industrial companies have made great strides at becoming more energy efficient in recent years.

There's also ample evidence that there's still much room for improvement.

The manner in which most manufacturers approach energy management remains the greatest barrier to maximizing energy efficiency. The typical approach is to launch one or more small projects that produce a quick—and sometimes even substantial—return on a relatively small investment.

All graphics courtesy: Kaeser Compressors

However, once these quick-ROI projects are completed, manufacturers often have trouble finding additional ways of improving energy efficiency.

Often, this is because management doesn't believe energy management projects can have the same impact on the corporate bottom line as finely tuned production processes or well-orchestrated customer acquisition strategies.

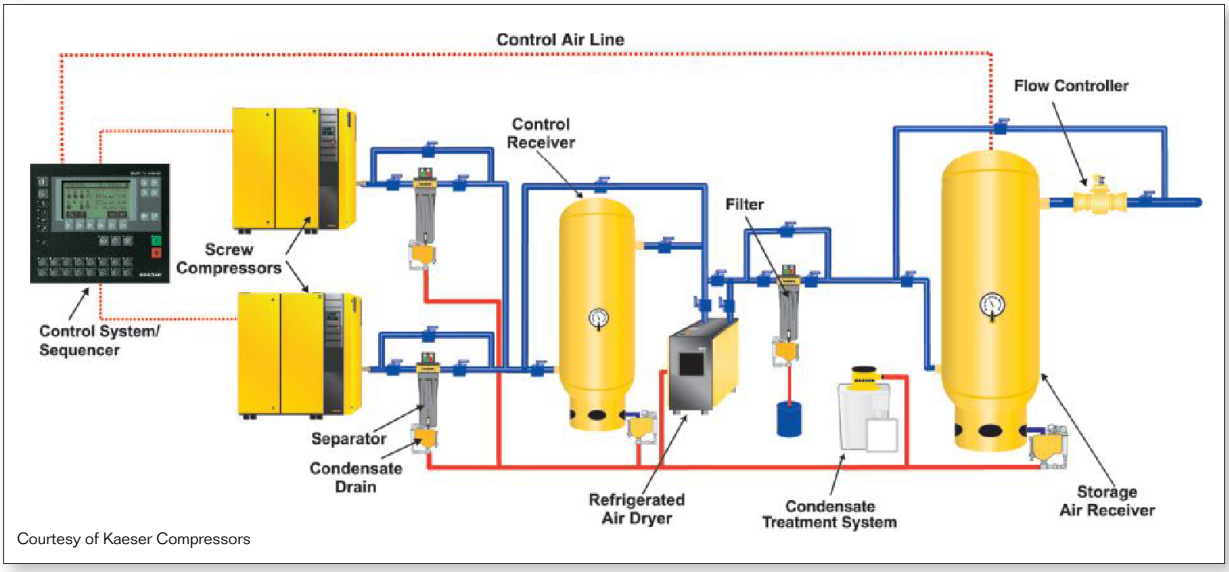
This belief also stems from the way most industrial companies approach energy management. Experience has shown that energy performance gains from various one-off energy management projects do not deliver sustained energy performance improvements, particularly if those projects are not monitored and adjusted in a continuous manner.

To ensure sustained energy performance gains, energy should not be considered a fixed operational expense. It must be managed just as carefully as production, quality, and safety. To do so requires the collecting of quantifiable energy performance data.

In a 2012 global survey conducted by Deloitte LLP, only 12% of chief financial officers chose the word "excellent" when asked to rate the quality of the sustainability data they normally receive. Industrial companies could benefit from the implementation of data-driven business practices that will result in continual energy performance improvements.

Key energy-performance indicators

The best approach to reducing your energy expense and use is to take a holistic view of your energy portfolio. This is typically best done by having an independent energy-engineering firm review your energy portfolio. The energy-engineering firm will want to review all of your facilities and determine the key



Courtesy of Kaeser Compressors

Optimized compressed air system: **This diagram depicts multiple compressors controlled by a system controller, followed by clean-air treatment and a storage air receiver with a flow controller. This setup ensures optimal use of energy.**

energy performance indicators (KEPIs) that drive energy use. These KEPIs may be different at each facility depending on what industrial process is performed at each facility.

Each facility should have accurate energy cost and use data for each commodity that is utilized at the facility. This information will determine which facility should be addressed first. Typically, one would start where both use and cost are the highest, which leads to energy projects that will yield the largest saving opportunities in the least amount of time.

Once a facility has been identified as a viable candidate for an energy management project, the following steps can be taken:

- A preliminary facility assessment to determine energy-saving opportunities
- Energy project development with associated return on investment calculations
- Project approval and funding
- Project implementation
- Project measurement and verification.

The controls arena offers many opportunities for reducing energy consumption in industrial facilities. These opportunities cover typical major pieces of equipment that exist in various industrial environments.

A master system controller can be used to stage multiple compressors in complex systems. Strategic pressure sensors are deployed in the distribution headers and used to provide feedback to the control system. The pressure readings, along with the rate of change of the pressure readings, are used to select which compressors should run to meet the load and, in some cases, what the loading should be on the compressors.

The same concept of properly controlling multiple air compressors can be carried over to other compressor applications. These include chillers and refrigeration compressors. In all of these cases, a master system controller can maximize the efficiency of the units by minimizing the number of partially loaded compressors.

Holistic view to energy management

Industrial companies should be at the forefront of the energy efficiency movement, since this sector outpaces most others when it comes to energy consumption. Motors consume roughly 65% of industrial electricity in the U.S., yet only 10% of these applications have an efficient method of keeping motor speeds in sync with process demand. In the production environment, there are significant savings and benefits to be gained through effective energy management of motors and production equipment.

Understanding the facility's total energy usage over time—knowing why energy is used and how that consumption impacts overall operating costs—is critical to implementing a plan that will result in true cost savings. Energy improvement initiatives, when properly executed, can easily yield a 15% reduction in use.

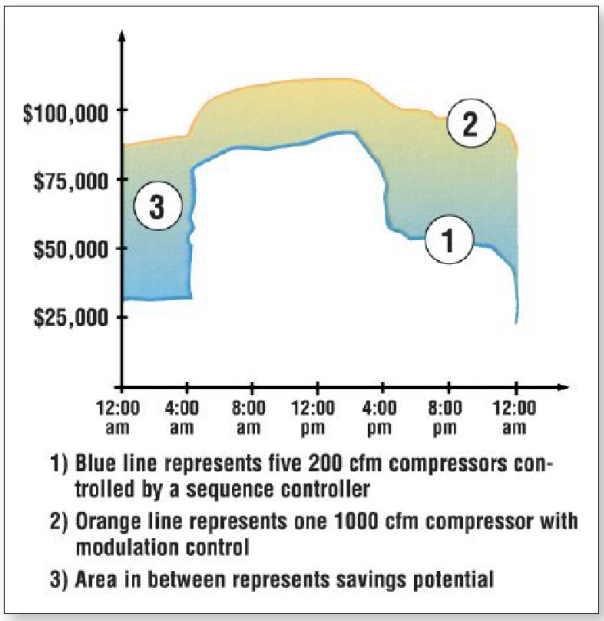
KEY CONCEPTS:

- The manner in which manufacturers approach energy management remains the greatest barrier to maximizing energy efficiency.
- Energy performance gains from various one-off energy management projects do not deliver sustained energy performance improvements, particularly if those projects are not continuously monitored and adjusted.
- A holistic, enterprise-wide energy management strategy views energy as an input to production along with materials and labor. The goal is to optimize energy use throughout the production environment while minimizing energy costs and waste.

A holistic, enterprise-wide strategy approaches energy as a manageable asset to help offset future energy price increases. This approach views energy as an input to production along with materials and labor. The objective of such a strategy is to maintain optimum energy procurement and utilization throughout the production environment while minimizing energy costs and waste. However, it is impossible to manage what is not measured.

Using meters, sensors, programmable logic controllers (PLC), intelligent motor controllers, and power monitors connected through energy management software tools, manufacturers are able to integrate energy metrics into production operations by capturing and analyzing energy data to make strategic energy decisions. Typically, metering starts with the main, then at each switch gear, and then at each high-value asset.

In a case study reported by Rockwell Automation, a North American packaging company used plant floor energy consumption data to determine that a piece of equipment was using an excessive amount of energy during the first shift. The company rescheduled production on that piece of equipment to the second shift and saved $66,000 in one year due to a reduction in peak demand charges.



Operating cost savings: This graph shows the savings associated with operating five 200 cfm compressors with a computer-based controller versus a single 1,000 cfm compressor.

Using the proper controls and techniques allows a facility to save energy and money. The key is to work with qualified personnel, either internal or external, that know the proper systems and requirements of both control systems and the processes that they are to control for optimal performance and efficiency.

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CONSIDER THIS

■ If you're constantly hitting the wall in terms of how much performance improvement you can get from your energy management projects, isn't it time to adopt a different approach?

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