

# Energy Management Systems

BY DIANE BACHER

**E**nergy costs were about 20 % of New Jersey's \$390.4 billion GDP in 2008 and utility rates are very high. In fact, commercial and industrial utility rates in New Jersey are higher than most states. Here in NJ, commercial consumers pay 13.13 cents/kWh for electricity. The US average commercial rate is 10.07 cent/kWh (See Chart). The result: high utility rates put more of a burden on NJ businesses. However, because energy costs are second to salaries in operating expenses, there is a lot of opportunity to improve profit margins with increased energy efficiency.

For those businesses interested in cutting energy costs to improve profits, there are two options, one is to negotiate reduced rates with your utility company (or directly with your energy supplier), the other option is to consume less energy; both of which require good data on your businesses energy use, which can only be derived through a good energy management system.

## **What is an Energy Management System?**

Since the inception of the modern electric grid, utility companies have been mandated with insuring reliable and continuous energy supplies. Using computer-aided programs such as Supervisory Control and Data Acquisition (SCADA), which is recommended by the Federal Energy Regulatory Commission (FERC), utility companies monitor critical infrastructure, and warn of possible dangers and disruptions. Utilities generate revenues by selling energy; so while SCADA programs are useful in meeting federal policies on ensuring energy reliability, they are not easily transferred to sectors that want to decrease energy use, however SCADA tools designed to measure and transmit data provide the basis for a business energy management system.

An energy management system is a tool that monitors energy use. It can be as basic as a spreadsheet with data from utility billing statements entered manually or as sophisticated as equipment sensors that monitor and transmit data directly to central processors. The system is only a tool. To really achieve increased profit margins, managers and employees must be trained to understand the data they're collecting--the utility rates, business energy use and associated costs--and then be able to reduce energy consumption in areas that are going to be most effective at reducing overall costs.

# Help Cut Costs and Improve Profits

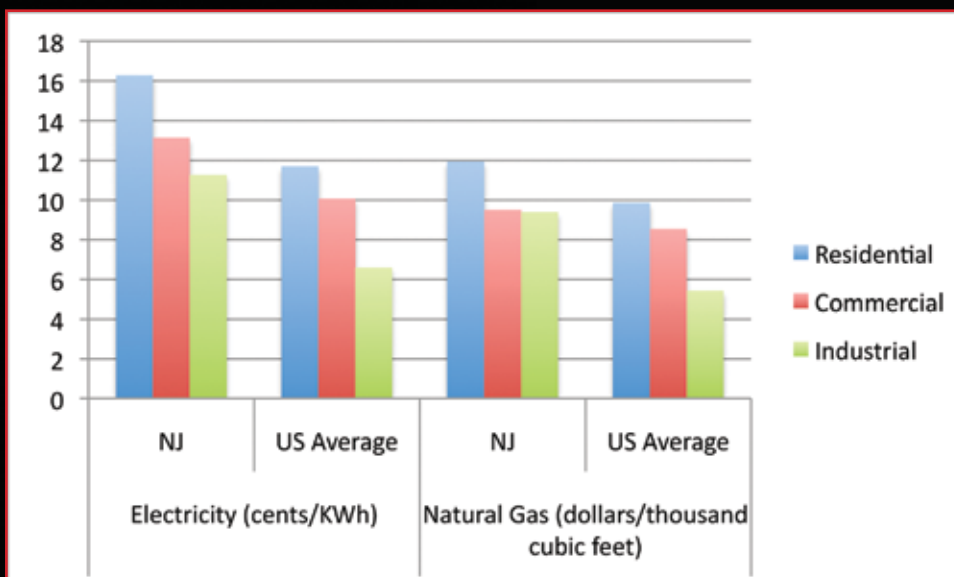
Consider this scenario: The electronic trading of financial transactions that occur in split second time frames. An interruption in energy flow could mean thousands if not millions of dollars in lost revenues. Like utility companies, data centers must insure continuous reliability. To maintain reliability, data centers are designed with inherent redundancies across numerous servers. Using the real-time data collected on energy use, the IT administrator could decrease the load of non-essential servers at specified times, while also maintaining necessary redundancy; however, the primary responsibility of the IT professional in this role is focused on reliability. Energy use often falls into the realm of facility management, where employees are tasked with managing costs, but lack direct control over the equipment necessary to implement load shedding.

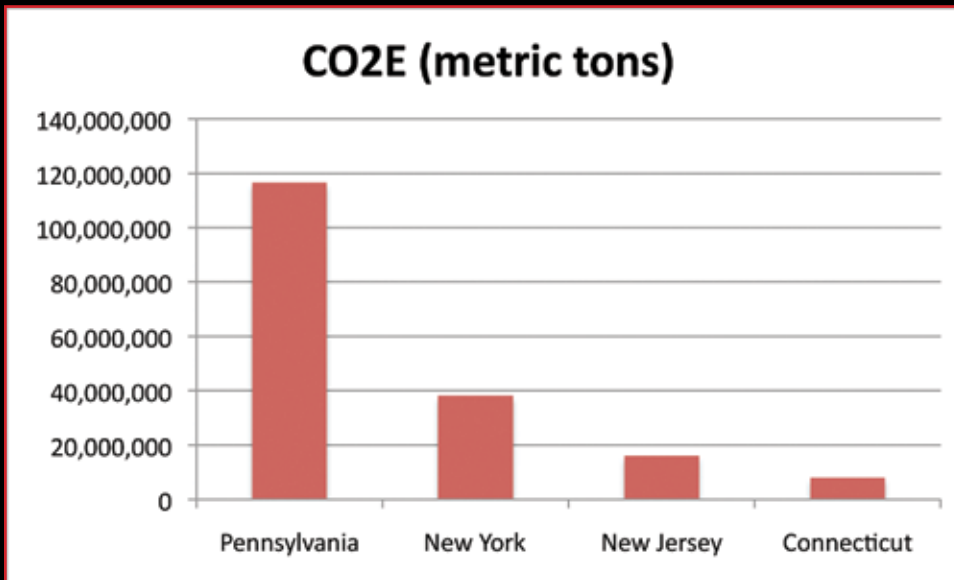
## The Process: Measure then Manage

The first step in energy management is to develop an accurate understanding of how much energy a company uses, which can be done by manually entering data from utility bills into excel spreadsheets or using data sensors meshed with specialized software applications. The latter is more accurate in that individual sensors will delineate energy consumption by different types of equipment, buildings, and industrial processes, providing a more comprehensive and detailed picture of the energy usage of a business.

Measuring energy usage can be tricky. It is important to note that businesses with facilities in different regions are exposed to different utility rates, an important driver in energy costs. Similarly, a business's carbon footprint varies for facilities in different regions depending on where you obtain your electricity (See Chart). In this region, more carbon emissions are produced if you purchase your electricity in Pennsylvania and the least carbon emissions are produced if you purchase your electricity in Connecticut. New Jersey electricity generation produces more carbon emissions than Connecticut but less than New York. (Pennsylvania follows Texas as the state with the most carbon dioxide emissions in United States). Both utility rates and carbon emissions are externalities that business cannot manage internally.

However, once you have measured your current energy usage, you can develop a benchmark indicator that can be used to evaluate how effectively you manage consumption. It can be as simplistically derived as the aggregated energy value divided by the total floor area or you can invest in a central processing system that will automatically produce benchmark values directly from equipment. Benchmark indicators provide values to compare energy management programs; however, benchmark indicators reflect energy consumption—not costs.





The trick to using energy data effectively is to figure out what direct actions are most effective in lowering costs. One way, which was implemented by the data center industry, is through the use of more efficient technology. Intel and Advanced Micro Devices have developed chips that use multiple electronic brains that perform at lower speeds to save energy. SeaMicro has developed a server that consumes 75% less energy than others, using less space; it requires no software modifications and supports cloud computing. Data centers that use such high-efficiency servers can eliminate any conflicting mandates between IT departments and facility managers, resulting in optimum reliability and lower energy consumption and in turn lower associated costs.

A company can analyze the benchmarks to see the cost savings of new servers by comparing them with past usage levels of the old servers, and then implement updated guidelines for equipment purchase resulting in an even lower energy consumption and higher savings.

### Demand Response vs. Decoupling

Measuring and managing energy use are pieces of a puzzle that must include information on the fluctuating costs of energy. Two programs demonstrate the elasticity of energy prices.

“Demand Response” is a program offered by utility companies during peak demand periods, often during summer’s high temperature season. Because utility companies must insure reliability they will reduce rates for users who reduce consumption during high periods. You may have walked into a Big Box store in July and noticed the lights were dimmer than usual. The store voluntarily turns the lights lower to conserve energy and reduce costs, taking advantage of the demand response program. Apparently, cost savings during peak periods are giving companies incentive to partake in additional energy management practices to achieve cost savings year round. Service companies that offer energy management and demand response programs in our region include EnerNoc, Comverge, CPower, Honeywell, and Schneider Electric.

“Decoupling” is a rate program being promoted by utility companies in certain regions because as consumers decrease use, revenues have declined. Since the recession, energy use has declined significantly, since the recession began, and this is attributed to a combination of

factors: the weak economy, milder weather and an increase in energy efficiency. It appears that overall energy use will continue to decline with increased efficiency and benign weather, lowering profits for utilities companies. To cover fixed costs, utilities employ “decoupling” methods that strive to remove profit incentives from energy sales.

Two decoupling methods have been used in other regions: State utility commissions in California and Ohio both approved methods when fixed costs were not being covered by rates because of increased efficiency and/or lower consumption. One method raised rates if revenues fell below a certain point; the other charged a monthly flat fee. Decoupling is a way for utility companies to maintain revenues and utility commissions approve of these increased fees to encourage utility companies to promote energy efficiency programs. However, consumers have lodged complaints because of the perception that increased rates through

decoupling were not related to efficiency programs but to demand decreases attributable to the recession.

### Role of Renewable Energy

There are conflicting reports about the status of renewable energy--whether it is an expanding resource or not. Currently, most business owners shy away from renewable energy because they see more cost (and carbon emission) savings associated with energy efficiency in comparison to renewable energy installations, as demonstrated through energy management programs.

However, an important caveat stands for NJ. NJ is second to California in terms of the most renewable energy projects; NJ has a high renewable energy standard and renewable energy supplies must be purchased from within the state. Additionally, NJ provides long-term periods associated with renewable energy credits creating an optimum environment to get more renewable energy projects financed in the state. Increasing renewable energy projects, increase clean sources of energy, which facilitate a decrease in a company’s carbon footprint for buildings within the state.

### Tools for Good Energy Management

Energy management systems are excellent tools at identifying energy use and the areas on which efficiency programs should focus; however, the lack of information on fluctuating utility rates is a major weakness. Some energy management systems include predictive analytics to estimate future rates and even weather events that can cause disruptions to energy supplies. These analytics are particularly useful in negotiating better rates to hedge energy costs. Businesses can negotiate with utility companies or directly with energy suppliers. Furthermore, energy management systems that provide data on supplies are going to help you determine an accurate carbon footprint. Most importantly, human oversight is necessary. An energy management program without employee buy-in is not going to perform well. Watson may have beaten the humans on Jeopardy but managers and employees are integral in assessing the effectiveness of lowered energy use, or negotiated reduced rates ■

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