How to Justify the Cost of an Energy Monitoring System

By **Bill Holmes, P.E.** June 20, 2011 03:15:37 pm

As we were discussing the possibility of installing an energy monitoring system in the Mariah Meat Packing Plant in Columbus, Indiana, John Stadler, the company president, said to me, "Of course I am interested in managing and reducing our utility costs, they represent our third largest expense after personnel and raw material. Reducing utility costs could be the key to our survival. But right now, I have no idea where those dollars are being spent." John clearly understood the need for energy information and approved the installation of an AutoPilot Monitoring System without asking me to estimate savings.

The project and resulting data uncovered the fact that the biggest energy user in the plant, the refrigeration system, was using five times the amount of electricity that it should and had been doing so for perhaps as long as 30 years. The local utility had previously done an energy audit and completely missed the problem. So had all of the Mariah employees, maintenance personnel, outside contractors, operators and everyone else who had worked on the system in the previous 30 years. There is a good chance I would have missed it, too, without the real-time and historical data from the monitoring system.

The data allowed Mariah to slash its refrigeration costs plus avoid a planned expansion of the refrigeration system, which saved several hundred thousand dollars. It also provided data to make critical business decisions that may have been the key to the plant's survival.

In my experience, John's understanding was unique. More often than not I have been asked, "Why should I invest in a monitoring system? How can I justify the cost of instrumentation? What are you going to find? How much will it save? What will the payback be? What is the ROI?" If I knew those answers at the beginning of a project, I wouldn't need to install monitoring. But how could I possibly know what we would find when in nearly every project, the monitoring has allowed us to uncover problems that couldn't be seen without it; that had previously been hidden from everyone's view? In this case, the monitoring had essentially allowed us to look inside of the refrigeration system and see information that no one else had seen. It allowed us to identify the existing problems, and determine the causes and the solutions. Managing energy with and without a permanent monitoring system is analogous to the difference in the way medicine was practiced before and after the x-ray machine.

For 32 years I have been installing permanent energy monitoring systems. With a background in instrumenting energy systems on fighters during my seven years in the Air Force, it was clear to me from my very first energy conservation project that in any effort to conserve energy and reduce utility costs, the installation of a monitoring system must be the first step. It's the best money you can spend with the quickest payback. As the first line on the cover of our 1990 sales brochure read, "The first step in cutting utility costs is finding out where you are spending your money." It's as true now as it was then. Thankfully, as the first generation that grew up with computers is moving into management positions, more and more people understand and are making information-based decisions like John did.

Justifying the Cost of Instrumentation

It makes no sense at all to try to justify the cost of energy monitoring instrumentation purely on savings projections and the return on investment (ROI); not without a very accurate crystal ball. It's not appropriate. It may be for some capital projects, but it's certainly not for instrumentation. If John Stadler had insisted on such criteria, Mariah would have missed the huge opportunities that were uncovered. So would have RCA, GE, GenCorp, Golden Castings, the Commons Mall, the Jackson County Hospital,

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Author Bio

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Bill Holmes, P.E. founded Holmes Energy LLC www.holmesenergy.com and developed the AutoPilot Monitoring-Based Commissioning (MBCx) System in 1979. He has a B.S. and M.S. in mechanical engineering and has done additional coursework and research for his PhD. He is a former Purdue professor and taught for several years in the Continuing Education in Energy Management Program at the University of Wisconsin.

Bill has produced savings from 20% to, in a few projects, more than 50% from low-cost, no-cost changes in management, operation, maintenance and control alone in all types of facilities including Industrial Plants owned by Fortune 500 Companies.

He is the recipient of a DOE Award for Energy Innovation and was the Indiana Energy

the Quinco Mental Health Hospital and many of our other projects where monitoring uncovered hidden problems and tremendous savings opportunities. Projects where the owner did not require us to guess what we might find before purchasing the system. Luckily, after a few projects, our approach and results spoke for themselves.

I have seen people use ROI criteria to justify a capital project with a 15 or 20 year payback and reject spending money on instrumentation that often has a payback in weeks or months, because no estimate of savings could be provided. But in my experience, instrumentation will always expose a 10% or 20% savings opportunity in energy systems. In several of our projects, energy costs for the total facility were reduced 40% or more with no capital improvements required; the savings resulted entirely from changes in accountability, responsibility, operation, maintenance and control that were only possible because of the data from the monitoring system. Trying to calculate ROI on instrumentation that is required to uncover potentially huge savings opportunities that may have been there and gone undetected for years, in some cases since the building was built, is a Catch 22 or chicken and the egg situation. It doesn't work.

In hindsight, after a huge opportunity has been exposed, it's easy to ask why someone didn't catch the problem much earlier. But we have found them in sophisticated systems in Fortune 500 facilities operated by top-notch people. In most cases it's no one's fault; it's the status quo. It's the norm, the current state of buildings and building systems. People get used to how their buildings or systems run, assume or are told that's the way it has always been and needs to remain, and in the absence of information to the contrary, accept it.

Utility Cost Accounting

The real question people should be asking is not how much can we save from instrumentation, but where is every dollar going that we are currently spending every month on utilities? Just the same as they demand for every dollar spent for purchases other than utilities. How can you, your company, your boss justify spending one dollar on energy, on utilities, without knowing where those dollars are going? How can you not have instrumentation? Why are you treating energy dollars differently from all other dollars? If you don't think thousands or millions of energy dollars spent each month are worth tracking, why do you track other expenditures? Why do you assume that the benefits of a cost accounting system do not apply to energy costs? Do you just assume that utility costs are a fixed overhead that you have to pay? That you have no choice? If you do, you couldn't be more wrong. Why don't you manage your energy dollars like you manage all of your other dollars?

On the other hand, why don't you manage your other dollars like you manage your energy dollars? Why do you have a permanent accounting department at all? Just set up a temporary department to do an expenditure audit. Once most of your expenses have been identified, and categorized, just shut the department down. Nothing will change. No need to continue to break things down into individual costs; just look at the total coming in and going out every month. Get rid of all of those expensive employees! No need for them anymore. Think of the money you'll save!

An effective Energy Monitoring System is really a financial management tool if you think of energy in terms of dollars rather than kilowatt-hours, therms or gallons. Can you imagine a business where every department just spends what they want to keep their department functioning? Do you tell your employees to just to do the best they can to keep their expenses low? That you trust them to know what's best? No matter how good your employees are, without information, their hands are tied. Think of the waste.

That is basically how utilities and utility costs are (not) managed today and why there is such tremendous potential from monitoring. Everyone runs their equipment and systems the way they have been trained or the way they have decided they need or want to; without any instrumentation, feedback or incentive to run them in the most energy-efficient way possible. And they have no way to know the impact their actions have on operations in the rest of the plant. How can you think that monitoring or tracking energy consumption, an area where it has never been done before, cannot uncover huge opportunities for savings?

Parting Thoughts

In spite of what you read in the popular press, not much is really being done to reduce energy usage in industrial plants. As I talk to long-time friends and others involved with industrial plants and energy systems, I always ask them what is actually being done to manage and reduce their utility costs. The answer is always, very little.

One of my closest friends, who has been in the building energy systems business for nearly 40 years, recently experienced one approach. As he was walking around one of the largest printing plants in the United States with the plant engineer, the person responsible for all of the utilities, he noticed posters everywhere touting what their Green Teams had accomplished in terms of reductions in energy use and greenhouse gas emissions. He was impressed and asked the engineer what they had done. The plant engineer's answer was, "as far as I know, the only thing we have done is put up those posters."

Why so much talk and so little action? I wish I had a good answer. But I think there are a number of

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factors. Number one has to be the commitment and incentive provided by top management. Unless they are serious, it's just not going to happen. And according to a friend and former CFO for IBM, for most top managers, it's a non-issue. It's not something they think about or talk about. They just leave it to the guys in the facilities department with whom they have almost no interaction. They spend their time focusing on their products, their mission and their profitability; in many cases seemingly unaware of the impact reducing utility costs could have on profits.

Number two is, even if you are really interested and committed, what do you do? There are so many people selling so many products and services and so many claims and promises and such a long trail of failures, "Who you gonna trust?"

There are no magic bullets, no simple solutions for complex problems as so many would like to believe. Energy use in large buildings and systems is very complex. My advice is to return to the fundamentals of good engineering problem-solving and financial management: start by installing instrumentation, gather the actual information, the facts, then view energy as dollars; treat energy management as financial management and integrate it with your existing financial management and accounting system.

If you are contemplating energy projects, don't invest money in capital projects with only a calculated or projected ROI. Demand unbiased, independent instrumentation and data to verify your energy usage both before and after the project and your savings.

As C. Lewis Wilson wrote in Heating/Piping/Air Conditioning, January 1983, in a quotation I have saved for nearly 30 years, "Let us propose that tracking energy simply be accepted as a management information tool that can help to define objectives and verify benefits. Energy tracking is equivalent to financial accounting. Energy monitoring and targeting is a management approach that enables firms to manage energy as a controllable resource in the same way as they manage other resources such as finance and people. A good tracking program includes management commitment, accountability by the energy manager, and data formats that are clear in presentation."

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