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## Energy Management: Monitoring Is the Key to Control

By **Bill Holmes, P.E.** December 21, 2011 05:33:50 pm[Email](#)[Print](#)[Like](#)

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In the spring of 2010, I received a copy of a white paper by Opto 22 titled, "Automation and the Smart Grid: Energy Management Today." When I read it, I thought, finally, here's a company that gets it, many of the same points I have been making since I have been in this business. Opto 22 makes very high-quality industrial automation equipment and sells it all over the world. In fact, I have been installing their hardware as a part of our monitoring system for 30 years.

So I went to Temecula, California to talk with the author of the paper, Benson Houglund, an Opto 22 vice president. He's about the age of my son and obviously very bright, as he agrees with me. As I recall, when we met, I said, "I've been waiting to meet you for 30 years." And I had; someone who gets it.

Benson is one of "the kids" who grew up with computers. He is too young to remember the oil embargo of the early 1970s. Now, with everyone hooked up to information 24 hours a day, totally comfortable with the value of information and in fact, demanding information, the time I have been awaiting for so long may be finally here. Benson showed me a really cool iPhone app he had written, called up his house and demonstrated how he could see every appliance running, how much power it used and how much it cost. Oh yes, he showed me his hot tub too, even a live video. Amazing!

Not exactly the Apple II with a 300 baud modem that I started with. Benson began to tell me how companies could use information to open up all of the possibilities to understand and reduce utility costs, and create a whole new profit center. I got out some of our sales literature from the 1980s and 1990s and followed along, sometimes word for word, as he was telling me all of the ways information could be used. As I showed him some of it – I think I may even have insinuated that he had somehow managed to get copies of our literature before he wrote his white paper.

As we were talking, I recalled a famous quote from Harry Truman: "The only thing new in this world is the history that you don't know." But the technology is definitely new and has far exceeded my expectations in terms of the ease of getting information and disseminating it. Harry was wrong about that.

Benson had first worked on the Opto 22 corporate headquarters. By monitoring and accumulating information on energy usage, informed changes were made to the energy systems operation resulting in a 30 percent reduction in energy costs. Then he applied the same methods to his house with the same results. I showed him a number of my case studies documenting similar savings in all types of facilities for the past 30 years; savings ranging from 20 to 70 percent. We were on a roll. We talked the rest of the day; he brought several different people in and out for me to meet and what a great day it was!

Now that the problems with getting and sharing the information are essentially solved, we should be able to concentrate on using it and saving energy and money. But that won't be easy; attitudes need to be changed. New skills need to be learned. The fact that accurate information is required to make good decisions has been accepted by few in the energy conservation business until recently. Most either missed this point, failed to understand its value or didn't want to confuse their customers with the facts. But now, as the next generation is "discovering" this opportunity, they also have the advantage of all of the new technology to help them.

A few hundred years ago when my ancestors began to walk upright, they knew they needed information

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## Author Bio

**Bill Holmes, P.E.**

**Bill Holmes, P.E.** founded Holmes Energy LLC [www.holmesenergy.com](http://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

in order to be able to outrun the saber-toothed tiger and continue their gene pool. And they knew to a large extent what information they needed. They needed to know if there were tigers around, where they were, how hungry they were, how fast they could run, etc. But before radar, infrared scanners, satellite images, iPhones and all that, they just had to rely on whatever was available to them. For me, the strongest indicator of the presence of a saber-toothed tiger would have probably been the smell coming out of my pants. But whatever tools they had, apparently they worked or I wouldn't be writing this.

Now, it seems, the energy conservation industry is about to have many more great tools available to them. I have waited more than 30 years for the old generation to either basically die off or just be sitting in a chair somewhere with slobber running out of the corner of their mouth, and that time seems to have finally arrived.

The more Benson and I talked, the more it was obvious that we had much in common. We had different backgrounds and different experiences, but we had each discovered many of the same "truths" at about the same age. It was just that I had reached that age about 20 or 25 years before he did. He said he was an engineer with a controls background and had been with Opto 22, a controls company, for about 15 years. Oh my God! What did I just write? A controls guy, my most hated enemy! What was I even doing in the same room with him? But wait; what he was saying was making perfect sense. How could that be? I asked him, "How can you, who I am supposed to hate, to absolutely despise; you who have shamelessly profited by selling all of those building owners the Rube Goldberg control systems with thousands of extra parts that didn't actually do anything, that never worked right, without regard for their needs, for so many years, actually be making such perfect sense? How can that be?"

First of all, Benson explained, Opto 22 does primarily process control in industrial plants. When Henry Ford started building Model T's, he stationed workers at fixed positions with fixed responsibilities along a line. What started at the beginning was basically just the steel frame. As it moved along the line of workers, one or two may have added the axles, then others the springs, then the driveshaft, engine and transmission, etc. By the time it reached the end of the line, it was a complete Model T. Someone spun the crank, started it up and drove it off the line. Henry got to where he could "crank" one out every minute, a total of fifteen million sold, all the same and he sold them for \$360 each, more than a year's wages for most people back then.

Today, most of the steps of building cars are done by robots controlled by industrial processors or computers, like the ones Opto 22 makes. They have to work every time and with the quality of today's cars, they have to have great precision; many times that a worker could provide. When my 1926 Chevy was built (and no, I didn't buy it new; I am not that old), it had shims for the door hinges to move the top or the bottom of the doors in or out so they would, hopefully close and latch. Even so, I still had to lift up a little or push in at the top sometimes to close a door. Unless you have been in a wreck, those days are gone. And a big part of the reason is information technology and the process controllers that Opto 22 and others make.

Benson then explained to me that as a controls company, Opto 22's success depended 100% on monitoring, on accurate information. How could you know what to control without precise information? First you had to define what you wanted to accomplish, then break it down into individual steps and then design controls for each step. Monitoring sensors had to be included to provide feedback to the controller to make sure it was doing it right. Each process is unique and control strategies are designed for the specific requirements of each process. Each solution is tailored for each problem.

The manufacturers of the automobiles or the airplanes are the ones who define precisely what they need. They don't call Opto 22 and say, "We are building a car but know nothing about controls. Would you design a process control system for us without our input, and then sell it to us at whatever price you demand, and oh, by the way, make it proprietary so you are the only ones who can bid on it?" None of this energy-conservation stuff of first developing the solution and then trying to apply it to every problem, whether appropriate or not. No cut to shape, pound to fit, paint to match.

By now, I was starting to relax a little talking to Benson. My hand had left my wallet, and I stopped trying to recall all of those Six Sigma Black Belt positions. I was pretty sure I was not going to have to kill him.

After I got back home I thought about my meeting with Benson and the others at Opto 22, and our discussions about how to use monitored data. It all made a lot of sense. So I again pulled out his white paper and looked for the key points. Three that jumped out at me were:

Manager of the Year in 1990. He has published numerous papers and been making presentations on his projects and methods for more than 25 years. Bill is a sculptor, a writer and a regular contributor to Sustainable Plant.

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