

Baltimore Gas & Electric Company



For over 180 years, Baltimore Gas and Electric Company (BGE) has provided customers in its 2,300-square-mile service area reliable, low cost energy. Until the recent advent of deregulation, BGE, as all U.S. utilities, serviced an assigned franchised area for a regulated rate of return determined by a Public Service Commission. The driving force behind deregulation is to invoke competition and theoretically drive the price of electricity down. In 1991, in anticipation of deregulation, BGE began developing a foundation to perform as a profitable, world-class energy company.

BGE employed condition-based maintenance to reduce costs and increase power generation in order to be ready to capture an expanding market. BGE selected Entek as the foundation technology to integrate all condition-based maintenance information. Between 1994 and 1998, the Company proudly reported to its stockholders total cost savings exceeding \$16 million related to the condition-based maintenance program. In addition, they increased production by 14% while reducing costs and improving heat rate.

"Our predictive maintenance practices helped us achieve the lowest forced-outage rate among the PJM (Pennsylvania, Jersey, Maryland) companies. That means our plants keep producing when it's most profitable to do so."



The BGE Annual Report states, "New technologies and an aggressive predictive maintenance program helped us produce an additional 426,000 megawatt hours at eight key fossil-fuel power plants. We finished the year producing more than 18 million megawatt hours, an all-time record for our fossil plants."

Deregulation Creates Opportunities

The State of Maryland is pursuing competition. Under a proposed plan by the year 2002, opening the electric utility industry to all customers in the Baltimore area will select their electric supplier. In this new era, a majority of the marketplace will make a decision based on price. To get a lower price, the consumer might choose a supplier located hundreds of miles away.

Terri Spicher, Principal Engineer/Supervisor, Predictive Engineering Unit, emphasizes, "Our objective is to be the low cost producer of electricity without sacrificing power generation availability, reliability of equipment, and safety. If we accomplish this objective better than our competitors, then deregulation will reward us with substantial growth opportunities."

She continues, "Our fundamental business model is changing dramatically. We are going from an exclusive franchise market with a regulated rate of return, to a completely open market where each customer has a choice to select his or her electric supplier. Many utilities see deregulation as a threat to their protected customer base and their bottom line profits."

At BGE, we see the opportunity not only to continue servicing our existing customers, but the potential to expand our market into other geographic regions."

Condition-Based Maintenance Provides Strategic Advantage

To compete effectively in the deregulated market, BGE knew they needed to minimize costs and at the same time maximize the plants' power generation capacity. Since maintenance is one of a utility's largest controllable costs, BGE began by looking for ways to improve operational efficiency and reduce operations and maintenance costs. BGE initiated a condition-based maintenance pilot program in the late 1980's. In the early 1990's, they began standardizing a condition-based maintenance philosophy across all fossil fuel plants.

"We selected Entek as our strategic condition-based maintenance vendor," recalls Spicher. "They were a vendor with a clear vision of the value of integrating information from multiple plants and from a variety of condition-based technologies such as vibration analysis, oil analysis, etc." Entek helped BGE move from a single, stand-alone condition-based maintenance system, to a local area network (LAN), and

ultimately, to a wide area network (WAN) to integrate all of their technologies and sites into one coordinated system.

"We strongly believed that a condition-based maintenance program would allow us to reduce generation costs and increase total generation hours. We knew this combination would have a direct impact on the bottom line and provide BGE with a competitive and strategic advantage in the market," says Spicher. As part of its comprehensive condition-based monitoring program, BGE routinely monitors over 1300 pieces of rotating equipment, all motor control centers, more than 600 high energy valves, all boiler duct work and expansion joints, and air-in and airborne leakage for several plant systems.

Monitoring Results

Since 1991, BGE has tracked the impact of their condition-based maintenance program. "To date the results from our condition-based maintenance program combined with other Divisional initiatives have been very fruitful," praises Spicher. "Between 1991 and 1996 we increased power generation by 29%, this is particularly impressive when you consider that it was accomplished without any additional capital equipment or plant capacity – only using existing resources.

In this same period, we decreased total operations and maintenance expense by 40%, decreased our fuel budget 16%, and decreased OSHA reportable incidents by 60%."

"These results prove that we are accomplishing our primary business objectives. We have created a foundation upon which we can build to capitalize on the opportunities of deregulation and to grow our core business of power generation."

Keys to BGE's Successful Condition-Based Monitoring Program

Spicher describes the five elements that BGE considers key to the success of its condition-based monitoring program.

Documenting Financial "Gains"

From the program's inception in 1989, BGE implemented a standardized process to analyze and document the cost savings that are a direct result of their condition-based maintenance program. They call it "SAVES." "We instituted a financial analysis process that is based on deferred maintenance cost." "Through this ongoing process, we continually prove the value of our program by relating it to bottom line business results. As well as evaluate where our problem equipment is and how to strategically plan for the future. We developed a cookbook of formulas that we use to calculate the cost savings across material, labor, fuel, and the power generation lost opportunity cost."

Upper Management Support

With the support of senior management, BGE continually reinforces the strategic importance of their condition-based maintenance program. One example of this support is the results incentive award program. For fossil energy employees, a percentage of their base salary is based on goals. PDM "SAVES" had been a yearly goal. By relating maintenance performance to individual financial performance, management sends a clear message to everyone in the

Baltimore Gas & Electric Company

Baltimore Gas & Electric Company (BGE) is the nation's first gas utility and one of the earliest electric utilities. For over 180 years, BGE has a tradition of superior, low-cost service and reliability. BGE's vision is to perform as a world-class energy company. Their mission is to achieve complete customer satisfaction by providing superior energy products and services. Their performance has resulted in increased dividends yearly.

With assets of more than \$8 billion and nearly 8,000 employees, BGE serves more than one million business and residential electric customers and 557,000 gas customers in an economically diverse, 2,300-square-mile area encompassing Baltimore City and 10 surrounding Central Maryland Counties. BGE owns and operates ten electric generating plants. BGE Gas Operations provides residential gas storage, distribution and commercial delivery in a 617-square-mile area through two gas plants and ten gate stations in and around Baltimore.

organization that maintenance cost savings are an important competitive component.

Full Integration of Condition-Based Practices Into Overall Maintenance Philosophy

"Looking back on our success, one of the most important decisions we made was to incorporate our condition-based maintenance practices into our existing maintenance organization and philosophy. This allowed us to accelerate the acceptance and understanding of condition-based techniques into our organization.

"Between 1991 and 1996 we increased power generation by 29%, this is particularly impressive when you consider that it was accomplished without any additional capital equipment or plant capacity – only using existing resources. In this same period, we decreased total operations and maintenance expense by 40%, decreased our fuel budget 16%, and decreased OSHA reportable incidents by 60%."

The impact was that we started to see results quickly and everyone felt that they were on board and part of this positive effort." We integrated PDM with our PM program in 1992. This has been financially beneficial without sacrificing reliability or availability of the equipment.

Integrated Test Technologies

BGE has embraced a wide range of test technologies (oil analysis, vibration analysis, motor monitoring, etc.) throughout multiple fossil fuel power generation facilities. "We use a variety of condition-based technologies and apply

Condition-Based Maintenance Results

Baltimore Gas & Electric Company (BGE) documented condition-based maintenance cost savings between 1994 and 1998 of more than \$8 million. Between 1991 and 1998, they reported:

- Increased Power Generation by 14%
- Decreased total operations and maintenance costs per KWH by 40%
- Decreased OSHA reportable incidents by 61%
- Reduced motor rebuild costs from \$3.2 million to \$995,000 per year
- Eliminated preventative maintenance of boiler feed booster pump scheduled every 5 years at a cost of \$20,000. At one location, #11 boiler feed booster pump has not been overhauled in the past 10 years; at another location #12 boiler feed booster pump has not required an overhaul in 12 years.

them to our equipment as appropriate. Our primary objective is to integrate our condition-based maintenance information from multiple sites, so that we can make quality maintenance decisions. The Entek technology is the foundation that has allowed us to tie all of our hardware, software, and most importantly our information, together to give us a clear view of the status of all of our critical equipment."

Partnership with Entek

Entek and BGE have worked together to build a software database with hardware that meets the needs of the organization. Spicher concludes, "We are in constant contact with Entek. We utilize the industry experience and technical expertise of Entek's staff. EMONITOR Odyssey™ is an important component of our maintenance practices."

Assessment Process

Approximately every three years, BGE conducts a formal assessment of their condition-based maintenance program. The assessment is used to identify specific strengths, weaknesses, opportunities, and threats. "This process is very valuable to us. The recommendations that come out of this exercise are the basis of our five-year strategic plan. The plan guides our tactical activities and ensures that we stay focused on the business objectives of the division."

ENTEK PROFESSIONAL SERVICES

Customer Support

Our people are our product. We are very fortunate to have an outstanding staff of support professionals who are committed to the success of our customers – YOUR success! Our staff has a wide variety of experience and education, including mechanical, industrial and electrical engineering; PC, database and operating system technologies; customer service; chemistry; and electronics. Technical proficiency is a requirement for providing you with knowledgeable and accurate answers, but our commitment to serving our customers in a friendly, caring, professional and timely manner is what will help maximize your return on investment.

ESAFE

ESAFE is a comprehensive offering of services and product updates to ensure the success of your long-term success in operating a condition-monitoring program. Entek is committed to standing behind its products to ensure that you are successful in reaching your equipment reliability goals. Because Entek is fully committed to customer support, your investment in ESAFE will guarantee peace of mind, allowing you to focus on getting your job done. Participating in the ESAFE program assures you of on-going support, product up-dates, information exchange and more! Each customer is unique, which is why we offer a flexible range of ESAFE packages -Bronze, Silver, Gold and Platinum – allowing you to select a specific level of service to meet your particular needs.

Field Service

Implementing an effective condition-monitoring program is critical to your success in meeting the equipment reliability, productivity and business goals of your plant and company. A strong commitment to implementing the program is necessary to achieve your objectives, and if you have this it is certain you will succeed. The real question is, how quickly will you have a program that is delivering powerful results and are you doing it the best way possible using all the capabilities and efficiencies of your products? Entek's field service engineers are experienced in starting up and running successful condition monitoring programs and helping existing programs improve. They have seen what works and what doesn't. They are also experts in Entek products and different condition monitoring technologies. This expertise can help you reach your condition monitoring goals and see results sooner.

Repair Centers

When your equipment is in need of repair, you want a reliable repair center that is quick, convenient, and cost effective. Entek offers factory in-house repair, service, and calibration for our entire range of products - even products no longer part of our current line. As the original equipment manufacturer (OEM), we are the most knowledgeable and the most qualified to service our products. Supported by more than 150 combined years of technical service experience, our repair technicians provide the highest quality service for your Entek hardware.

Entek Educational Services

The best tools, when used by unskilled craftsmen, will still result in unsatisfactory results. This is true in many aspects of life, but especially in the application of Condition Monitoring techniques and technologies in today's demanding plant environments. Yes, you need to be equipped with the best tools, but you must also receive the proper training to get the maximum benefit from your investment in a successful Condition Monitoring or Reliability program.

Experience, knowledge and quality are the foundation of Entek's training seminars. Technology training is available as well as product training courses; all presented by the most qualified instructors to meet your needs. Choose from on-site seminars and classroom training conducted all over the world to help you gain the maximum benefit from your machinery reliability investment.

Reliability Online (ROL)

Reliability Online is a unique service designed to provide results with minimum investment in equipment training and personnel. Reliability Online takes advantage of either the Internet / e-mail and a central group of highly skilled condition monitoring engineers to give you the best possible condition monitoring program.

Reach us now at www.rockwellautomation.com or www.entek.com

Rockwell Automation Americas Headquarters, 1201 South Second Street, Milwaukee, WI 53204, USA, Tel: (1) 414 382-2000, Fax: (1) 414 382-4444

Entek Americas – 1700 Edison Drive, Milford, OH 45150, USA, Tel:(1) 513 576-6151, Fax: (1) 513 576-6104

Entek Europe – Bumpers Lane, Sealand Industrial Estate, Chester CH1 4LT, UK, Tel: +44 (0) 1244 374914, Fax: +44 (0) 1244 379870

Entek, Emonitor Odyssey, ESAFE, ROL are registered trademarks of Entek International Corporation
Windows is a registered trademark of Microsoft Inc. Other trademarks are the property of their respected owners

Publication ENCOR-AP102A-EN-P – October 2000
First Published 1999

