

# PowerChain Management Audit



*Powering Business Worldwide*



# Power System Evaluation

Location of facility: \_\_\_\_\_  
 Facility manager: \_\_\_\_\_  
 Date of audit: \_\_\_\_\_  
 Auditor: \_\_\_\_\_  
 Square feet of facility: \_\_\_\_\_  
 Date of construction: \_\_\_\_\_  
 Date of expansion: \_\_\_\_\_  
 Number of plant shifts: \_\_\_\_\_  
 Construction drawings available:  Yes  No  
 Owned or leased:  Yes  No

Reliable

Efficient

Safe



# A well

# Business check for your power system

A well-managed power system is the foundation of any successful enterprise, delivering reliability, efficiency and safety. But as an organization grows, demands on the power system increase, necessitating equipment additions or replacements. Over time, the power system evolves into a disparate collection of equipment that doesn't always deliver the desired results. It can become more complicated, inefficient and harder to manage—even as expectations for its performance rise.

Eaton's comprehensive portfolio of PowerChain Management® solutions helps enterprises meet those expectations, improve sustainability and increase competitive advantages through proactive management of the power system as a strategic, integrated asset throughout its life cycle.

PowerChain Management solutions include power distribution, power quality, control and automation and monitoring products. When combined with Eaton's full-scale engineering services, these products can deliver

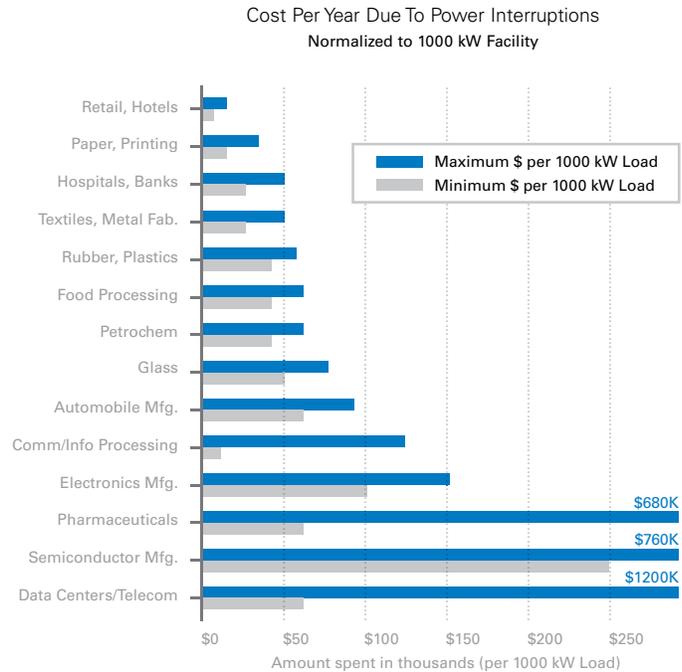
powerful benefits to your enterprise, including greater reliability, energy efficiency and enhanced safety.

Whatever your industry—whether it's commercial, industrial, infrastructure, mission critical, renewable energy or government/public sector—Eaton has a PowerChain Management solution. And of all those solutions, one of the most strategically important may be the one that checks the health of your system: the PowerChain Management Audit.

# Confront the risks of power hazards and inefficiencies

## Examining the health of your system

The complexities of today's power systems can be overwhelming. A simple change to one part may inadvertently cause a problem elsewhere in the system. That's why a holistic and preventative PowerChain approach is essential to evaluating the health of your system.



### DID YOU KNOW...

## Reliability

The U.S. economy is losing between \$104 billion and \$164 billion to outages and another \$15 billion to \$24 billion to power quality phenomena.<sup>1</sup>

Nearly 80% of power disturbances that interrupt business occur due to problems within the facility itself.<sup>2</sup>

### DID YOU KNOW...

## Efficiency

A global effort to boost efficiency with existing technologies could eliminate more than 20% of world energy demand by 2020.<sup>3</sup>

Today's best energy efficient techniques could save the U.S. half of the oil and gas and three-fourths of the electricity consumption.<sup>3</sup>

### DID YOU KNOW...

## Safety

The heat from an electrical arc flash can reach 35,000°F, three times hotter than the temperature of the sun.

An arc flash incident threatens personnel safety and can cost upwards of \$1 million in lawsuits, fines, facility damage and lost production.

<sup>1</sup> *The Cost of Power Disturbances to Industrial & Digital Economy Companies.* Electric Power Research Institute, 2001

<sup>2</sup> *Energy Expertise-Power Quality.* Alliant Energy Corporation, posted at [http://www.alliantenergy.com/stellent/groups/public/documents/pub/sb\\_ia\\_ee\\_pq\\_blaze\\_001177hcsp](http://www.alliantenergy.com/stellent/groups/public/documents/pub/sb_ia_ee_pq_blaze_001177hcsp)

<sup>3</sup> Michael Grunwald, "America's Untapped Energy Resource: Boosting Efficiency," *Time Magazine*, December 31, 2008

# Power disruptions, Efficiencies

## Benefits of Analysis

By examining and managing an enterprise's power infrastructure, businesses can expect greater reliability, operating efficiencies and a safe environment.



## Reliability

- **Uptime.** Maintain vital operations with steady, high-quality power
- **Warranty Costs.** Reduce unpredictable product quality
- **Reputation and Customer Satisfaction.** Eliminate power systems disturbances to maintain robust processes and data flow
- **Future Business.** Increase product quality and avoid warranty repairs resulting from unanticipated outages

## Efficiency

Reduce operating costs with effective energy management and maintenance strategies

- **Supply- and Demand-Side Management** Save money by optimizing utility rate structures, verifying utility charges, avoiding penalties and controlling loads
- **Energy Conservation.** Install energy efficient devices and meter/monitor usage to identify waste
- **Training.** Reduce maintenance expenses by educating staff to quickly spot and resolve problems
- **Renovation.** Modernize existing equipment for longer life and less maintenance

## Safety

- **Personnel.** Keep employees safe from electrical hazards, including arc flash
- **Compliance.** Ensure employees have the required personal protective equipment (PPE)
- **Labeling.** Label equipment properly to warn personnel of potential electrical hazards
- **Procedures.** Document safety procedures and train personnel to abide by them

## The Eaton Advantage

Eaton is a power management company uniquely qualified to provide PowerChain Management solutions. We have a complete line of electrical products and full-scale engineering services, enabling us to provide customers with holistic solutions customized to individual needs.

With many of the United States' leading Professional Power Systems Engineers, we have the expertise to most effectively identify, address and correct power-related problems. Not only do we address the various industry standards for electrical equipment—IEEE, NFPA, UL, ANSI, IEC and NEMA—many of our engineers have been tapped for their expertise by committees who develop those standards.

Eaton's Power Systems Engineers bring a system-wide approach to addressing power irregularities, looking at all aspects of a facility's electrical system—planning, design, finance, engineering, construction, installation, upgrades and monitoring—enabling businesses to focus on their core capabilities.





# The PowerChain Management

Many facilities have gone through upgrades and changes over the years. Electrical loads have been added to automate processes, computer loads have been added to the facilities, harmonics have been introduced to the system, and the loads are often much more susceptible to power quality issues.

A comprehensive PowerChain Management Audit can address such issues and consists of visual inspections, electrical measurements, interviews with onsite personnel and reviews of utility bills and data. Specifically, Eaton will analyze interruptions, voltage sags, harmonics, surge protection, grounding, energy management and arc flash safety.

Using proven IEEE Gold Book methods, Eaton engineers will evaluate your power system design to determine whether upgrading critical elements of the power system modernizing the system or simply rehabilitating the system is the most cost-effective method of improving safety, reliability and efficiencies.

The audit will evaluate the present state of the existing safety guidelines, including the use of personal protective equipment (PPE), and make recommendations for improvement.

Eaton will review energy consumption to determine possible savings via utility rate structures, energy usage, time of use (on or off-peak), power factor correction, and various methods of metering. Cost and payback information will be presented where appropriate.

It's important to take a holistic approach to the PowerChain Management audit so that you know which areas of the electrical infrastructure can be improved and which are designed, maintained and operating at optimum levels.



# t Audit

- Evaluate wiring and grounding methods
- Evaluate backup protection including the use of UPS power, backup generation, sag correction and power conditioning
- Review electrical energy management processes to determine demand-side management opportunities and analyze energy-efficient electrical loads
- Evaluate surge protection at the utility connection point and at the downstream loads
- Evaluate the use of harmonic solutions including tuned filters, line reactors, and phase shifting transformers
- Evaluate and review present arc flash safety compliance status
- Evaluate the quality of the voltage and current at the main service equipment
- Interview key electrical personnel on site to determine the type of operating problems, the equipment affected, and time of occurrences

## PROCESS

### what will you do?

- Have a preliminary meeting with Eaton to discuss your potential power quality, energy management and electrical safety concerns
- Complete a simple questionnaire
- Participate in a pre-site conference call with one of our engineers
- Walk the facility with our engineer, providing access to your electrical equipment as required

### what will we do?

- Analyze existing system data and prepare a test plan for your site
- Monitor critical processes or loads where possible
- Evaluate power quality concerns related to your loads or caused by external events
- Evaluate electricity usage
- Ensure safe work practices using NFPA 70E and IEEE 1584 arc flash guidelines

### what can you expect?

- A detailed engineering summary and evaluation of your electrical system
- ROI evaluations for suggested solutions, where appropriate
- Courteous, professional and safe work practices by our highly qualified staff
- Access to our engineering services group through your PowerChain Management Audit engineer

## EXPECTATIONS

### what will we deliver?

- Energy management recommendations
- Electrical energy management solutions
- A detailed plan to ensure compliance with NFPA 70E's arc flash safety standard
- A detailed engineering report with specific conclusions and recommendations
- A peer review of your report by one of our Power Systems Engineers on staff
- A report presentation to you and your staff with a review approximately three (3) months post-audit to ensure complete satisfaction

# PowerChain Management Audit Offerings

PowerChain Management Audit Offerings	Tactical	Operational	Strategic
Preliminary analysis of the power system	✓	✓	✓
Site meeting and project overview	✓	✓	✓
One day on-site system evaluation	✓	✓	✓
Level 1 IEEE Power Quality Audit	✓	✓	✓
Electrical energy management assessment	✓	✓	✓
Energy management needs assessment	✓	✓	✓
Arc flash needs assessment	✓	✓	✓
Preliminary, on-site presentation of initial results	✓	✓	✓
Off-site analysis and evaluation of site data	✓	✓	✓
Formal report and web-based presentation	✓	✓	✓
Ongoing telephone and email support for six (6) months following site visit	✓	✓	✓
Follow-up call with facility three (3) months following site visit	✓	✓	✓
Level 2 IEEE Power Quality Audit		✓	✓
Overnight monitoring of critical location		✓	✓
Reliability analysis per IEEE Gold Book		✓	✓
Power quality and arc flash training		✓	✓
On-site formal presentation of results and recommendations		✓	✓
Ongoing telephone and email support for twelve (12) months following site visit		✓	✓
Installation of Cutler-Hammer® power quality and energy meter at main service connection point			✓
Quarterly summary of captured data			✓
Yearly report summarizing power quality and electrical energy data			✓

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