

Three Dimensions of Energy Opportunities That Can Boost Profits and Asset Value

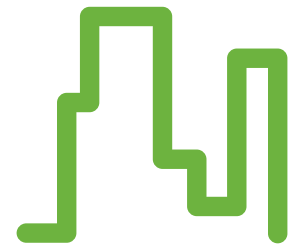
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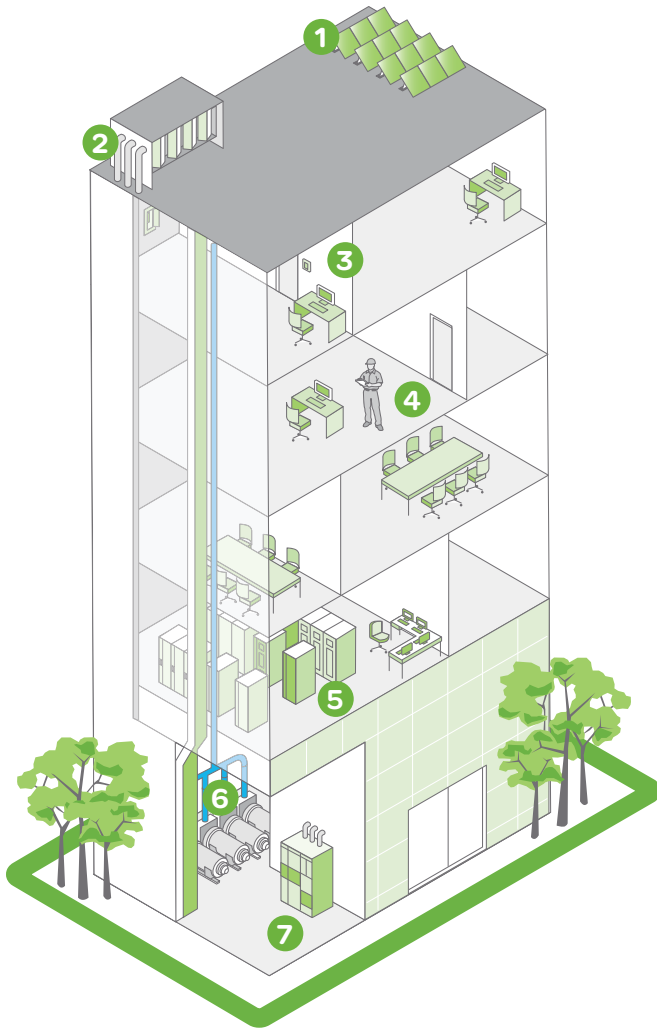
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Buildings

- Over 20% of consumed energy and growing
- 3 key areas: HVAC, lighting & integrated building solutions
- Technical projects can yield up to 30% of energy savings



Enterprise energy management offers a broad range of direct economic benefits to property owners and managers.

- 1 Renewable energy systems
- 2 Building automation and control
- 3 Efficient lighting and controls
- 4 Energy audit and lifecycle services
- 5 Data center and network efficiency
- 6 Variable frequency drives
- 7 Energy and power management solutions

Introduction

Commercial property owners and management firms are seeking new ways to maximize profits and property valuation. Energy use is often the largest single line item on an expense statement. As such it represents a range of opportunities for minimizing operating expenses, increasing net operating income, improving tenant satisfaction and retention, and achieving high-profile energy efficiency ratings. These can, in turn, increase asset value and enhance a property's image, which can attract new tenants.

To gain the maximum benefit, property firms need to address opportunities within all three dimensions of energy-related costs: fixed, variable and exceptional. This requires complete and timely intelligence that describes how energy is consumed across an entire property portfolio. New enterprise energy management technology delivers relevant, actionable information in economic terms, enabling key personnel to uncover all opportunities, decide on appropriate measures, and verify results.

“... there are still excellent opportunities to create value, but you might have to look at the expense side of the income statement to find them.” -

John P. Kelly, CEO, BOMA International¹

The Case for Energy Management

Property owners, management firms and brokerages regularly face challenges in maintaining or increasing profits and maximizing valuation. Beyond competitive pressures, other conditions may affect the ability to hit financial targets such as declining rental rates or a slower than expected recovery from the recent downturn.²

When seeking new ways to meet goals, energy is a significant and often-overlooked expense that can represent a substantial area of opportunity, delivering a range of benefits. Once energy and related costs are exposed as part of operating expenses and, in turn, the bottom line, their potential for releasing large amounts of wasted money becomes clear. Reducing these costs can help property firms survive tough times in the short term while reducing financial risk and strengthening competitive positioning into the future.

Empirical evidence documented by the United States Department of Energy (DOE) and by other independent studies indicates that utility costs can be reduced 25 percent or more if properly managed.³ Yet many businesses are not managing energy usage at all or are not fully leveraging all opportunities.

Commercial real estate enterprises are in a potentially unique and enviable position as compared with other industries in regard to energy. Given that energy represents as much as 30% of operational expenses on the average commercial property income statement, and combined with the plethora of research, tools and technologies, the opportunity to make a real impact towards improved net operating income (NOI) is huge.

¹ Kelly, John P., “Building Efficiency is Source of Profit in the Weak Economic Environment”, Real Estate Forum, August 2003

² 2003 BOMA Experience Exchange Report

³ Kats, G.H., et al, Energy Efficiency as a Commodity: The Emergence of an Efficiency Secondary Market for Savings in Commercial Buildings, U.S. Department of Energy Protocol, April 1996

Consider the following example:

The management firm for a 500,000 square foot office building makes a strategic decision to invest in the people, processes, information technology and other equipment required to achieve a 25% reduction in energy costs. With annual energy costs for a commercial office building averaging \$1.80 per square foot⁴, the expected savings will be \$0.50 per square foot, totaling \$250,000 in enhanced NOI. Even more significantly, at a 10% capitalization rate this could amount to a \$2.5 million increase in property value.

Reducing energy use and costs can also spur ancillary benefits, including increased tenant satisfaction and retention. With fewer natural resources consumed and lower emissions there is decreased environmental impact. This can help achieve “green building” sustainability certifications that offer a competitive advantage by attracting environmentally conscious tenants.

Energy performance can also reflect well on the skill of the management team and, in turn, on valuation. Investment firm Neuberger Berman stated, “We believe that quality energy management can be an indicator of overall management acuity.” The Energy Star organization also notes that “... <investment> firms totaling more than \$4 billion in assets under management are looking at companies’ Energy Star performance for signs of superior overall management quality.”⁵ In total, reduced expenses, increased profits and enhanced asset value will have a correspondingly positive affect on the overall economy that can be measured in billions of dollars.⁶

To begin to benefit from an energy management program, property firms first need to consider the many ways that energy affects their business. Like many operational expenses, energy and its associated financial opportunities can be considered in terms of three dimensions of costs: fixed, variable and exceptional. Specific information and functionality is required to take advantage of each one. Enterprise energy management (“EEM”) systems cost-effectively address all three dimensions, delivering the intelligence and insight to support effective decision-making and the automation needed to stay abreast of dynamic conditions and respond by controlling energy assets.

500,00 sq. ft. office building

Invest people, processes, technology and equipment



Achieve 25% reduction in energy costs

- Increased tenant satisfaction and property value
- “Green building” certifications

*“We believe that quality energy management can be an indicator of overall management acuity.”
The Energy Star organization also notes that “... Investment firm Neuberger Berman*

⁴ 2003 BOMA Experience Exchange Report

⁵ Energy Star, “Leveraging Energy Management Through Investor Relations”, July 2003

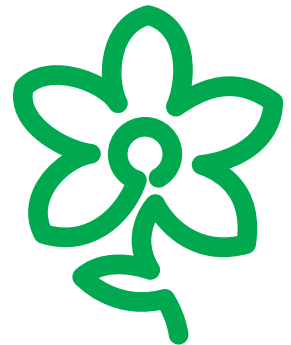
⁶ Kats, G.H., et al, Energy Efficiency as a Commodity: The Emergence of an Efficiency Secondary Market for Savings in Commercial Buildings, U.S. Department of Energy Protocol, April 1996

Taking it a Step Further with LEED Certification

Leading edge buildings employ design, construction and operational procedures that improve resource utilization and reduce environmental impact. LEED®, (Leadership in Energy and Environmental Design) was developed by the U.S. Green Building Council as the nationally accepted benchmark for high performance green buildings. LEED promotes a whole-building approach to sustainability by recognizing performance in five categories: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

Using an energy and power management system to better manage energy efficiency can contribute to approximately 25 percent of all possible credits awarded through the LEED certification process. Employment of such a full-featured system allows the user implement a wide variety of energy efficiency initiatives essential to attaining LEED certification, including:

- **Advanced Metering Requirements** – Benchmark the energy efficiency of an existing building and its systems to verify that new designs meet minimum energy performance reductions per ASHRAE 90.1 standards
- **Optimize Energy Performance** – Use the system to monitor all utilities and help decide when to switch to alternative sources of power, shed loads or net meter power back to the utility.
- **Water Efficiency** – Easy integration of data from water meters enables an energy and power management system to measure and validate the results of water conservation efforts.



Fixed Cost Opportunities

Fixed energy costs include a facility's typical base load of energy consumption as well as the resources required for administration, operations and maintenance. There is potential to reduce costs and overhead in each of these areas.

Cost Recovery through Tenant Sub-Billing

Energy costs are often allocated to tenants based on a common formula – normally based on the square footage of the tenant relative to the total leased space in a building – which can be highly inaccurate. Tenants are increasingly asking to be more accurately billed, and if they question a bill, they want to see supporting data. As a result, in some areas leases now include accurate submetering as a standard clause.

Even in buildings where sub-meters exist, the meters are often manually read by a service provider or in-house staff. The labor cost to collect data, process it, and create bills is high and the potential for errors can create even higher administration costs as well as tenant dissatisfaction.

Further, these methods typically provide monthly energy totals (e.g. kilowatt-hours) and not higher resolution interval measurements at, for example, 15 minute time intervals. Without interval data, tenants cannot be accurately sub-billed for coincident energy demand or other utility charges that are typically applied on top of a building's average base load. This lack of resolution also provides no insight into the opportunities that may be available to better manage costs.

EEM systems provide a complete sub-metering and sub-billing solution that supports all forms of utilities (e.g. electricity, gas, water). Systems can leverage existing tenant meters while allowing new ones to be added where required (Figure 2). Meter data is automatically uploaded on a frequent basis to the EEM software over corporate networks, the Internet, or wireless communications, realizing a low total cost of ownership while enabling limitless reach across all properties in a nationwide or worldwide portfolio.

Equipped with an integrated rate engine and data quality tools, tenant bills are calculated based on simple or complex rates with assured accuracy. An EEM system avoids the high labor rates associated with manual data collection while increasing tenant satisfaction.

Reducing the Cost of Operations

Buildings include a variety of high-demand loads, including HVAC components like rooftop units, chillers and fans, as well as lighting systems. In-house operations personnel or outsourced services periodically “tweak” a building automation system (BAS) to assure comfort based on some basic measured values and feedback from occupants.

Intelligent BASs offer lower capital expenses and reduce operating costs while improving the safety, comfort and energy efficiency of a building. Those with open, standards-based technology enables full integration of all building systems – such as HVAC, security, lighting, etc. – on one network and across enterprises from a single software platform. This allows for the collecting and sharing of vast amounts of facility and financial data which can be useful in making real-time decisions that improve business performance. Maintenance of systems and components is typically based on estimates of equipment operation and on predefined service schedules. These methods subject a property management firm to risk in terms of poor energy efficiency and potential equipment mis-operation or failure. Opportunities are often missed because energy-related information is often limited in both amount and accuracy. Though often considered a building’s energy management system, a BAS is primarily designed to react to set conditions, not to deliver the breadth or accuracy of data and analysis required to effectively control energy costs.

In contrast, EEM systems automatically collect and report detailed power and energy information from all energy assets, including HVAC, BAS, electrical distribution systems and onsite generators. An EEM system continuously tracks conditions and alerts operations staff to any potential problems before they occur. The source can then be quickly isolated using graphical facility overviews of real-time electrical and equipment status, historical information, and “drilldown” analysis. These tools help drive proactive maintenance, extend equipment life, avoid capital costs, and reduce labor.

EEM systems also deliver the information corporate and facility managers need to deal with energy in financial terms. Browser-based “dashboards” listing key performance indicators (KPIs) help track and verify enterprise-wide conditions and costs on a dynamic basis. Trending tools report on the complex relationships between energy drivers over a week, month, season, year or any other range.

Energy consumption for buildings and other cost centers can be easily aggregated and normalized to remove independent variables such as temperature or square footage from the profile. This allows for accurate direct comparison, helping identify inefficiencies and opportunities to reduce usage. For example, start-up procedures can be optimized to avoid demand peaks, HVAC settings can be adjusted to reflect occupancy and weather patterns, or elevator timing might be modified to reduce consumption.

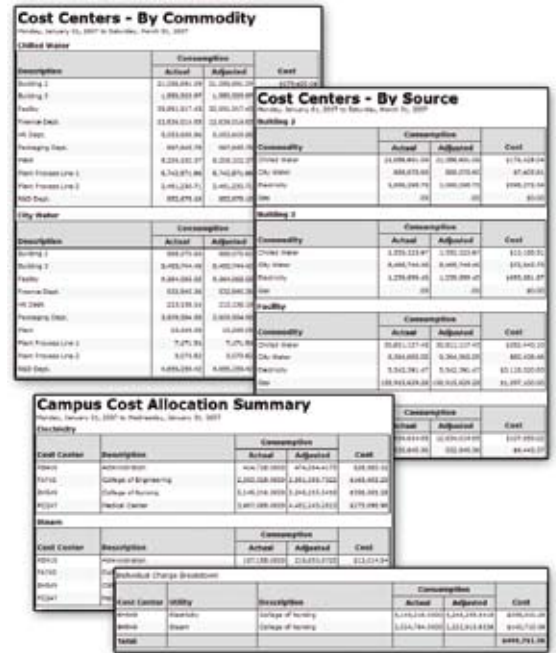


Figure 2: Automated sub-metering and sub-billing improves billing accuracy while reducing or eliminating the labor involved in reading meters and generating bills.

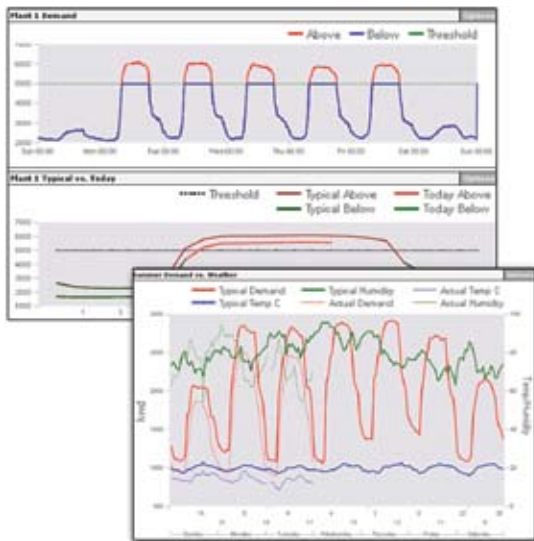


Figure 3: Example of EEM software with key performance indicators, benchmarking and normalization tools that help analyze and compare building performance and reveal opportunities to reduce costs.

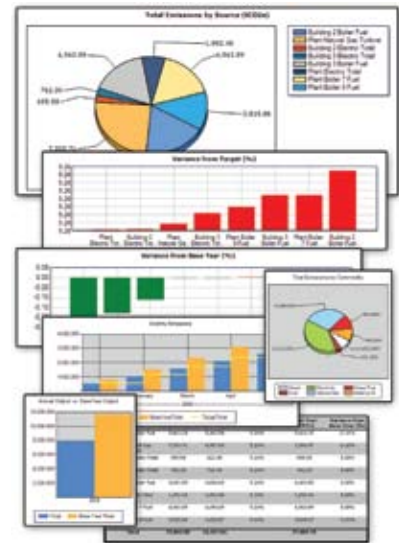
The EEM system will also provide an accurate energy baseline prior to any retrofit or initiative to help verify effectiveness afterward. Ultimately, building performance can be benchmarked (**Figure 3**) and the information used to support certification with nationally and internationally recognized rating systems such as those developed by the Energy Star® (a program of the US DOE) or ASHRAE organizations in the US, the LEED program, and the Carbon Trust's Action Energy program in the UK.

Furthermore, the recent Energy Improvement & Extension Act 2008 in the US spells out opportunities for tax breaks, deductions, accelerated depreciation, cost recovery and even project bonds associated with building energy management initiatives. A few are listed below:⁷

Extension of Energy-Efficient Buildings Deduction. Current law allows taxpayers to deduct the cost of energy-efficient property installed in commercial buildings. The amount deductible is up to \$1.80 per square foot of building floor area for buildings achieving a 50% energy savings target. The energy savings must be accomplished through energy and power cost reductions for the building's heating, cooling, ventilation, hot water, and interior lighting systems. This bill extends the energy efficient commercial buildings deduction for five years, through December 31, 2013.

Accelerated Depreciation for Smart Meters and Smart Grid Systems. The bill provides accelerated depreciation for smart electric meters and smart electric grid equipment. Under current law, taxpayers are generally able to recover the cost of this property over a 20-year period. The bill allows taxpayers to recover the cost of this property over a 10-year period, unless the property already qualifies under a shorter recovery schedule.

Extension and Modification of Qualified Green Building and Sustainable Design Project Bond. The bill extends the authority to issue qualified green building and sustainable design project bonds through the end of 2012. The bill also clarifies the application of the reserve account rules to multiple bond issuances.



Tracking Greenhouse Gases

Some EEM software solutions include modules with Greenhouse Gas (GHG) reporting, which can correlate a distinct relationship between a company's energy consumption and its consumption-based CO₂e emissions. This technology helps corporations achieve higher energy efficiency, while reducing energy-related emissions, costs and downtime.

It also results in accurate monitoring, modeling and reporting of CO₂e emissions to convert energy data into useful, actionable greenhouse gas information. Armed with facts, CO₂e emissions are no longer just an inevitable consequence of energy use, but a manageable variable in a company's operations.

The module tracks emissions from combustion boilers, furnaces, vehicles, chemical production or controlled process equipment as well as emissions from an organization's utilities such as purchased electricity or steam – those which emit carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) into the atmosphere. As the indirect emissions result depends on the amount of energy used and the mix of fuel that goes into producing this electricity or steam, the module helps delineate direct and indirect emission sources, improves transparency, and assists organizations in implementing their climate policies.

Shadow Metering to Catch Billing Errors

Billing errors from a utility or other energy provider can be another area of concern. Typical errors include inaccurate meter data, meter data incorrectly read or entered, billing on the wrong tariff, or skewed demand charges due to billing intervals that are too long or too short.

Errors that benefit the building (i.e. under-billing) can be as problematic as those that are in the utility's favor, as most supply contracts allow the utility to recover these missed charges months or years after the error occurred. For a commercial building, costs might not be recoverable at a later date if new tenants are occupying the space.

To help avoid these situations, EEM systems can be equipped with utility-class “shadow meters” installed in parallel with the utility's billing meters at the service entrance to each facility. Alternatively, the EEM system can import energy pulse signals from the existing billing meter, if the energy supplier is willing to provide this. The EEM software calculates an accurate bill, matching the utility's rate structures, and compares each billing period to the utility's bill to identify any inconsistencies.

Expansion Planning

The electrical systems and other energy distribution systems for new facilities are often over-designed, and additional capacity in existing buildings goes undiscovered due to a lack of information about energy consumption characteristics.

An EEM system delivers detailed load profiles for each building and major circuit, helping planners ensure the use of existing capacity is safely maximized to avoid unnecessary upgrades. Accurate data on existing facilities helps simplify the estimation of future expansion needs and ensures infrastructure for new buildings is “right-sized” to minimize costs.

Variable Cost Opportunities

How energy is purchased, how it is used by the building, and how it used by tenants are all dynamic processes that offer opportunities to reduce cost. Each depends on having the right information to support timely strategic and tactical decisions.

Better Energy Procurement

A range of benefits can be achieved through more efficient energy procurement processes and by making better deals with the energy provider. The negotiating power of the property firm is often dependent on the depth and quality of information available.

EEM systems will aggregate energy consumption across all properties, locally or across wide geographies. That information can then be leveraged to negotiate bulk energy pricing with a single supplier. Accurate energy cost forecasts and “what if” scenarios help evaluate the impact of choosing a different rate or tariff, or changing energy suppliers where a deregulated environment allows (Figure 4). Where prices fluctuate, this feature can also help quickly compare whether it is more profitable to shift loads or pay more for the energy.

Weather, occupancy, retrofit opportunities and other variables can be incorporated into future models. For example, predictions can be made regarding how an energy bill might increase if the average summer temperature increased by a degree. This combined functionality can help financial managers cost and determine the appropriate risk level and bounds.



Figure 4 Example of EEM software with tools to model energy requirements and perform rate comparisons based on actual usage data and utility tariffs.

Dynamic Control of Loads and Generation

In some regions, buying off real-time spot markets offers the potential to reduce costs, while load curtailment or demand response programs pay utility rebates for dropping energy consumption on request. Some suppliers offer discounts if the customer can simply demonstrate an energy management system is in place that can be used to support participation in such programs.

EEM systems provide the communications capability to receive real-time pricing signals from wholesale exchanges or curtailment signals from the local utility, and provide the analytic capability to help managers evaluate the opportunities against current or projected building usage and needs.

Alarms can be used to give advance notification before costs or consumption levels peak. The decision can then be made whether to manually or automatically reduce consumption until the curtailment period is over, energy prices drops again, or the building's load falls off. Consumption can be reduced in a number of ways, including switching off selected equipment or starting up on-site generators in a coordinated fashion. Ideally, such programs will include the participation of tenants to maximize load shedding potential.

Tenant Energy Management

Tenants can represent one of the largest opportunities to improve energy efficiency and reduce cost. In the case of gross leases, all energy conserved is a direct cost benefit to the property firm. With a fixed-base lease, the tenant will benefit by reducing any energy costs that rise above the maximum covered by the lease, while reducing further will pass savings to the landlord, which may provide incentive for the landlord to invest in efficiency measures.

For a triple net lease, it may appear as if any energy reductions would benefit only the tenant, and thus be a disincentive for the owner to investment in conservation. However, if administered correctly the owner can achieve the full benefits of the savings by “rebalancing the pie”, that is, leveraging the lower operating costs by subsequently increasing rental rates - keeping the effective cost to the tenant the same (Figure 5). Alternatively, energy cost savings can be used to lower the lease to improve a building's price competitiveness.

EEM systems convert raw energy data and complex utility tariffs into dollar values that the landlord and tenants can understand and act upon. Automatically generated reports can be distributed in paper, email or HTML format, providing tenants a view of their consumption and costs and, in turn, driving behavior. Helping tenants reduce energy use in this way helps increase profits as well as competitive advantage. As an additional benefit, as efficiency increases so too does a building's asset value.



Figure 5: Lowering energy costs provides an opportunity to rebalance the components of a tenant lease, benefiting the property firm, tenant or both.

Exceptional Cost Opportunities

The cost of poor power reliability and its business losses have been well documented by numerous independent studies in recent years. During one year, power outages interrupted operations at 72 percent of U.S. businesses.⁸ The cost of this downtime is significant. An independent study revealed 46% of companies surveyed said each hour of downtime costs them up to \$50K, while 8% said it costs more than \$1M per hour.⁹

Protection from Outside Disturbances

The source of reliability problems can sometimes be on the utility side of a facility's service entrance; for example, lightning causing massive power spikes on transmission lines that then propagates through to the customer. To guard against external sources, companies will often install filtering devices. A facility can also switch to UPS systems or backup generators in the event of major outage. These techniques will only be effective if equipment is continuously tested and optimized to ensure dependability.

EEM systems help engineers evaluate how the overall quality of power is impacting equipment and uptime. Permanently installed intelligent meters monitor key distribution points and upload real-time data and event logs to visualization software that helps personnel analyze conditions, isolate the source of disturbances or failures, predict future occurrences, and validate the proper operation of all mitigation equipment during a critical event (Figure 6).

The system can help baseline a facility's minimum power quality requirements. It can also compare conditions to international standards and determine if the energy received from the utility meets contractual requirements. Like a "black box" flight recorder the system will capture evidence that is often the key to receiving thousands or even millions of dollars of compensation from an energy provider.

Avoiding Internal Power Quality Problems

Computers and data processing equipment, motors, power switching or protection devices, and even equipment designed to mitigate some power problems can all add unwanted harmonic frequencies and high-voltage transients onto a facility's electrical distribution network. These, in turn, can cause data loss and malfunctions in computers, building automation systems, or process equipment. Worse, transformers and conductors can overheat and fail or power breakers can trip needlessly, any of which can cause a complete facility outage.

Using pager, phone, or workstation, an EEM system will alert personnel to imminent problems, help them isolate and analyze high-risk conditions, and perform the necessary control functions to avoid downtime and the associated lost revenues. Capital replacement costs can be avoided or deferred and workload for maintenance staff reduced. Being able to guarantee higher reliability can also help keep existing tenants satisfied and attract businesses that are especially sensitive to power quality glitches.

⁸ Contingency Planning & Management Online and Ernst & Young, 1997
⁹ Eagle Rock Alliance, Ltd., "2001 Cost of Downtime"

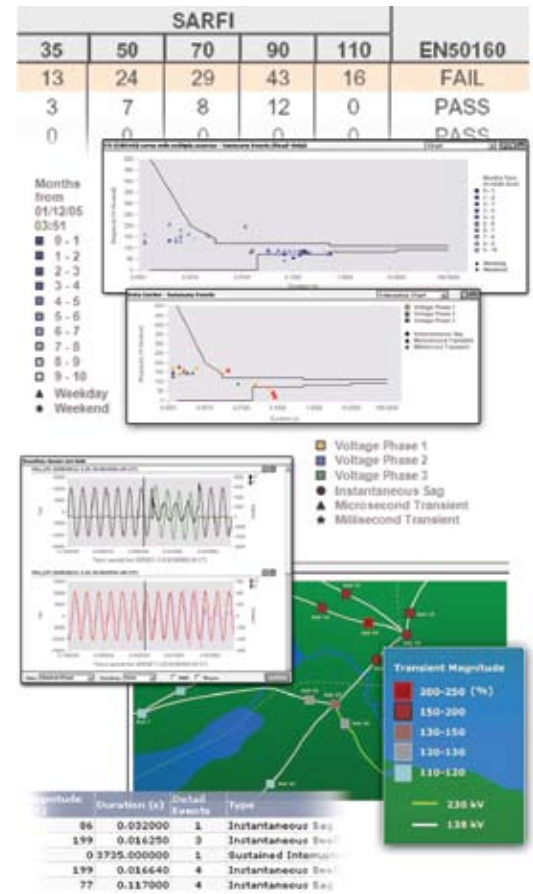


Figure 6: EEM systems help keep the power on by alerting operations staff to critical conditions, helping isolate sources, verifying backup system performance, and documenting importance evidence if an outage occurs.

Conclusions

“The buzzword in energy circles these days seems to be enterprise energy management ... EEM stretches well beyond building automation or energy management systems. Its roots are financial ...” Rita Tatum, Building Operating Management¹⁰

Commercial property firms have a great opportunity to significantly cut operating expenses, increase tenant satisfaction and retention, boost property values and reduce risk by taking control of all three dimensions of energy-related costs. As with any sound business strategy, achieving real and sustainable results depends on having comprehensive, accurate, and timely information upon which to base decisions.

Unlike traditional BAS or metering systems, enterprise energy management technology exposes fixed, variable and exceptional costs in financial terms. Customized web-based portals, key performance indicators, advanced analytics and normalization deliver immediate, accurate and actionable information from across a property portfolio. Data quality tools ensure that information from all sources is accurate and dependable. Tightly integrated hardware and software ensure high reliability, while cost-effective communications options and compatibility with legacy systems lower total cost of ownership.

Supported by the necessary corporate commitment and structured process, EEM systems can help to dynamically identify and respond to opportunities, drive best practices, and provide the essential follow-up that ensures energy investments realize maximum payback. From automated tenant sub-billing to improved procurement, operational efficiencies, and power reliability, EEM technology offers property owners and managers the key to extracting true financial and competitive advantages from energy.

¹⁰ Tatum, Rita, Contributing Editor, “Big Picture”, Building Operating Management, October 2001

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