

[It's All About the Data:]

Demystifying Energy Data Management



Experience & Guidance From:

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It's All About the Data: Demystifying Energy Data Management



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About Building Engines

Building Engines is a web-based suite of integrated modules that provides owners and managers of any property type with a comprehensive solution for improving operations and maintenance workflow management.

Building Engines helps companies increase occupant satisfaction, manage assets more efficiently, and limit exposure to risk and liability while reducing costs and enhancing management visibility into operations.

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BuildingEngines
Optimizing Property Performance

It's All About the Data:

Demystifying Energy Data Management

Executive Summary

Many governmental, non-profit and for-profit organizations promote the need for building owners to “go green” and develop energy-efficient buildings as fast as possible. They cite the cost-saving benefits of implementing new technologies to measure energy usage and reduce the green footprint of commercial buildings. Yet, measuring energy efficiency can prove to be a daunting task.

Building owners must plan their forays into energy data management carefully, and with realistic expectations. By taking measured, iterative steps into energy data management, building owners can develop a systematic means for capturing energy efficiency data, reporting on it as actionable information, and ensuring that the appropriate actions are taken to reduce energy consumption.

This paper outlines the key elements required for a successful energy data management (EDM) strategy. It also discusses the tremendous benefits of succeeding in EDM. At the same time, it provides insights into the potential causes of EDM program failure and ways to avoid making such mistakes.





Introduction: The Grass Isn't Always Greener

Building owners nationwide are launching energy efficiency projects in an effort to conform to “green” standards. By so doing, they are pursuing the commonly accepted benefits of going green - reduced energy costs, improved customer/tenant satisfaction, higher occupancy, and higher margins. But to successfully go green in a way that saves money, building owners must first get a handle on their energy usage and cost information. After all, the only way to improve energy efficiency is by accurately measuring and reporting energy usage data in a timely manner and then making the necessary changes for improvement.

For this reason, the need for energy data management, or EDM, is now widely accepted in the real estate industry as the foundation for an effective energy management program.

Establishing and adhering to EDM policies and procedures is core to measuring and improving energy efficiency. Those building owners who have successfully launched EDM projects enjoy several benefits from enhanced energy usage information. They can:

- Benchmark usage data within their property portfolio
- Benchmark usage data against Energy Star database of properties
- Normalize usage data and reveal issues faster
- Understand costs and cost drivers
- Recognize the easiest and lowest-cost areas for improvement
- Ensure accurate billing from their service providers
- Compare billing rates to the general market to better negotiate future rates

To successfully go green in a way that saves money, building owners must first get a handle on their energy usage and cost information.

Many governmental and non-governmental organizations have launched tremendous efforts to promote energy data management among commercial building owners. Examples include the Energy Star® benchmarking tool from the EPA and BOMA's 7-Point Challenge for no- and low-cost operation and management practices.¹ Most recently, the American Recovery and Reinvestment Act, which was signed into law in February 2009, earmarks over \$22 billion for energy efficiency projects. And the U.S. Green Building Council estimates that there are more than 35,000 LEED projects underway comprising over 6.9 billion square feet of construction space in all 50 states and 114 countries.²

1 BOMA International, *Market Transformation and The 7-Point Challenge*, www.boma.org/getinvolved/7pointchallenge/Pages/default.aspx

2 USGBC, *USGBC Names 'Top 10 List' of Green Building Bills*, Feb 24, 2010

While EDM projects abound, serious challenges exist for building owners seeking to establish robust energy data management across their portfolios. First, building owners suffer due to poor, incomplete, and/or untimely energy usage and cost reporting from their utility provider(s). Even if their utilities provide complete data quickly, building owners tend to lack adequate data-gathering mechanisms to collect and report on the energy usage data in a manner that is succinct and actionable. Either the utility does not yet provide electronic reporting, or the building owner does not have the correct electronic information exchange technology setup to automatically receive and analyze electronic data.

The situation is made worse for properties that maintain their energy-related information in complex, heterogeneous systems. For these owners, the amount of data to be collected can be overwhelming and difficult to summarize in a meaningful way. Additionally, EDM projects can be expensive if not properly scoped before commencement. In a time when occupancy and rental rates are both lower, most building owners will shy away from projects with a lengthy payback period.

Proceed with Caution

Organizations that promote green efforts and green technologies cite an array of technological advancements that make buildings smarter, enabling building owners to easily overcome the challenges of achieving robust energy data management. But building owners should proceed with care, ensuring that their forays into EDM are deliberate and measured, providing reasonable payback windows and predictable ROI in the medium-to-long term. Three critical steps must be taken to ensure an EDM program delivers strong ROI.

- 1.** Begin with a small, focused effort. There are simply too many factors to consider for most organizations to quickly ramp up portfolio-wide EDM. In other words, people don't know what they don't know. Property management companies that have launched major EDM projects quickly discover knowledge gaps in many areas, such as identifying sensor locations, understanding the ramifications of a growing number of network endpoints, or recognizing each building's unique quirks that inhibit data collection.
- 2.** Allow for integration time and cost. A general lack of protocols between Building Automation Systems (BAS) leads to unforeseen requirements for systems integration. It is getting easier to integrate systems using open protocols but, to date, no single solution exists to easily and inexpensively extract the information that resides in systems from multiple vendors.
- 3.** Recognize installed equipment limitations. Some equipment, such as older HVAC units or BAS, is nearly impossible to tap into for energy usage metering, particularly in older buildings. The effort and expense required to measure some units may outweigh the benefits of doing so.

A no-cost first step into energy data management: Obtain a free sample

The vendors who market and sell energy data management solutions have broad experience implementing their systems in a wide range of building types.

They can often identify a building owner's most promising short-term focal points for EDM payback. Some vendors are even willing to provide a free analysis of an owner's best potential areas for improvement. This helps them to prove their value while giving the building owner an opportunity to spot easy areas for improvement.



A small but focused energy data management program will help an organization make drastic improvements in a short period of time, particularly if it focuses on high-impact areas with easy access to information. Moreover, putting into place the core EDM processes, workflows, and technologies can provide exponential gains across an organization and not just in terms of energy usage. An established EDM infrastructure can provide continuous improvements in areas such as water usage, proactive equipment maintenance, tenant complaint volume, and centralization of multi-property management.

The What and the How of EDM

Several critical areas of information tracking must be established to make EDM a long-term success.

Obtaining Utility Data

Organizations must obtain accurate utility data. Some utilities are better than others at helping with this, and the variations among utilities can be tremendous. For example, the National Action Plan for Energy Efficiency, a joint effort of the US EPA and US Department of Energy, reports that many utilities provide customers with 12 months of cost, consumption, and demand data, while only a handful provide interval meter data and electronic billing in accordance with NAESB standards. The National Action Plan also points out that only one-third of utilities in the USA provide Electronic Data Interchange (EDI) to enable automated electronic access to data by customers' billing or benchmarking system. Some utilities even remain mired in a paper-based world, while others allow for complete Web-based self-service.³

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Assuming that a building or property manager uses the least advanced utility, EDM can still be achieved with some manual effort. For example, the Ashforth Property Management Company in Portland, Oregon began its EDM project while its utility only offered paper-based billing. Ashforth decided to manually input two years of data into its benchmarking system in order to normalize its usage data. The company did not use historical data from the prior two years because it wanted to include data regarding weather and other factors that affect energy consumption alongside the utility data. After two years, Ashforth was able to normalize the energy usage data, taking weather, seasons, and other factors into consideration. Today, Portland General Electric provides Ashforth with software for real-time consumption monitoring.

³ U.S. Department of Energy and U.S. Environmental Protection Agency, *National Action Plan for Energy Efficiency*, "Utility Best Practices Guidance for Providing Business Customers with Energy Use and Cost Data," November 2008

Ashforth leverages the real-time data to react quickly to weather conditions and consumption data. Building engineers can adjust HVAC units and other equipment as the sun moves throughout the day to discover optimal equipment settings and adjustment times. The company has been able to increase tenant levels while keeping energy consumption steady.

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Building owners that track, report, and normalize their utility data have proven to be more successful at enforcing truth in utility billing. They also arm their energy buyers with the data required to negotiate the best energy rates possible. This is especially true for owners who have responded to real-time consumption data by identifying opportunities to do load shedding during periods of peak demand.

Obtaining Building-Specific Data

Gathering data from utilities is only half the battle in EDM. Building owners must also regularly extract energy usage data from the different areas and equipment of their buildings. As noted earlier, the main challenges involve bringing together data from heterogeneous systems that are often proprietary, installing the necessary sensors to capture interval data, and building out a network able to collect data across multiple properties - all at a reasonable cost.

Establishing and maintaining an energy usage baseline

Building owners seeking to establish a solid energy usage baseline can leverage the standards established by the Efficiency Valuation Organization (EVO) (www.evo-world.org). EVO publishes the International Performance Measurement and Verification Protocol, along with publications that provide concepts and options for building owners to adopt when pursuing energy and water savings. Within these publications, EVO outlines standards for establishing a real and accurate energy usage baseline.



Case Study: Liberty Property Trust



Liberty Property Trust (Liberty) is one organization that took on the challenge of obtaining building-specific data. The company started small, targeted high payoff successes, and is in the midst of expanding its EDM program.

Liberty is a publicly traded real estate income trust that operates in six segments: Northeast, Midwest, Mid-Atlantic, South, Philadelphia/D.C. and United Kingdom. The company owns and manages 349 industrial and 290 office properties totaling 64.4 million square feet. Additionally, the company has an ownership interest, through unconsolidated joint ventures, in 47 industrial and 49 office properties totaling 13.8 million square feet and two properties under development.

As a first step to EDM, it identified 130 buildings that were intense energy users for which Liberty controlled the electric bill. It then measured total energy usage by individual building and developed a cost/benefit analysis by total building usage.

With all 130 buildings metered, Liberty captured energy usage data into its Tridium Network, which can handle data from all system types. The data from all 130 buildings gets consolidated into time-series data in graphical form, and Liberty can then drill down into 15-minute incremental details. Each morning, building property managers start their day by viewing hour-by-hour performance of the last 24 hours, keeping a close eye on peak load values. They then make building- and equipment-specific adjustments as needed to reduce peak loads and minimize billing.

Liberty sees its current efforts as positioning the company for exponential future benefits. Through EDM, the company recognizes that energy bills are often higher than needed because of battles between heating and cooling within the same building. In an effort to ensure that only one or the other is on at a time, Liberty is pushing to eventually track usage down to individual building systems, such as lighting or HVAC. It also wants distinct levels of detail by area. It anticipates being able to measure, for example, rooftop air temperature levels and having trending data to predict inefficiencies. The company will then be able to launch a proactive work order to fix the problem before it occurs. This type of proactive maintenance will preempt customer complaints on the hottest days while also saving Liberty time and money.

Energy data management is all about saving money by reducing energy consumption, while keeping occupants comfortable. To that end, simple and actionable reporting of EDM information provides tremendous benefits and is the foundation for an effective energy management program.

Figure 1 below shows a simple energy dashboard with a typical usage profile, with all outliers flagged for investigation. This enables engineers to view a snapshot of energy activities across all buildings and quickly perform corrective actions.

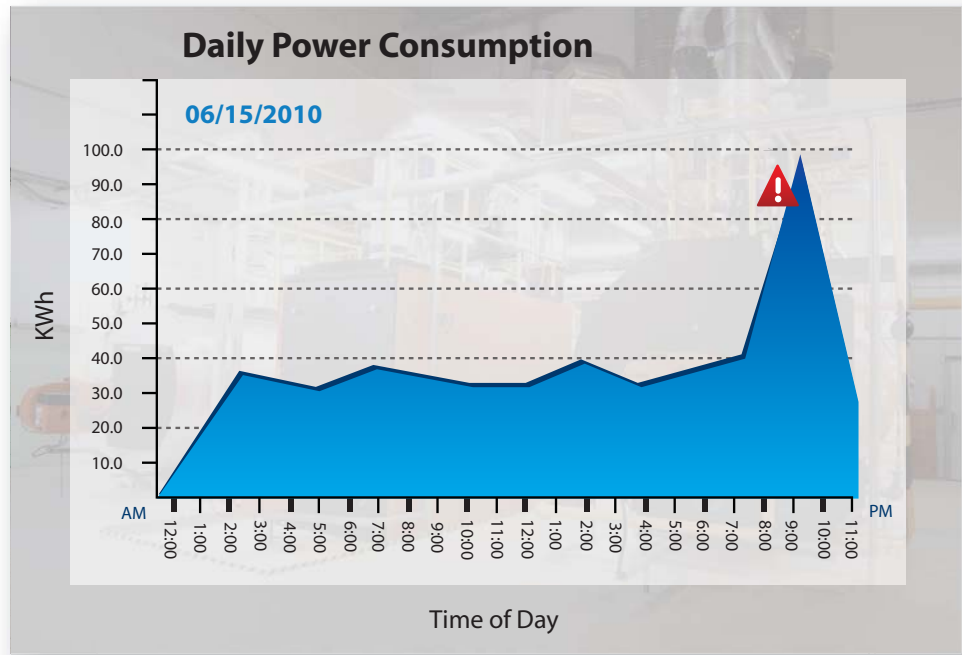


Figure 1: Simple Dashboard View

It's important to limit the energy dashboard and reporting to only the most critical items that affect energy costs. Establishing business rules to restrict reporting to the most meaningful and actionable data enables engineers to utilize the dashboard without suffering from information overload. Simplicity will lead to automation over time. In this way, energy monitoring, notification to management, and dispatch for problem fixes will bring about the future state in EDM, the Autonomous Building, wherein building systems actively help the manager maintain the asset in its optimum state.

Building owners that achieve EDM can leverage benchmarks in the EPA's Energy Star Portfolio Manager to elevate themselves over competitors. With thousands of buildings normalized for climate, age, size, and other criteria, the Energy Star database enables energy-efficient building owners to improve their sales and marketing to prospective tenants seeking to locate into green space. Not only can owners demonstrate their green leadership, they can also enable tenants to optimize their own efficiency by sending out tenant-specific energy usage alerts and enabling each tenant to view its own dashboard view of consumption.

EDM is an Iterative Process

Fortunately for all, energy prices dropped during 2009, but they are beginning to rise again as the global economy recovers from the recession and developing countries like India and China and increase their consumption. Regulatory pressure on utilities to generate growing amounts of power with more expensive renewable sources is also putting increasing upward pressure on energy prices. This is why EDM projects should initially focus on the biggest areas for improvement with the lowest cost requirements. That wasteful HVAC unit from the 1980s may appear as a small nuisance today, but is likely to become far more costly 2 – 4 years from now. EDM solution vendors and consultants can help to identify the best areas for initial focus.

A common area of early focus is energy profiling. Building managers often track energy profiles for several months before performing benchmarks. This provides enough time to become comfortable with true normal energy usage. It also provides building engineers with enough time to push the energy profile down as low as possible. With a solid energy profile, building managers can more easily identify and exclude unusual events that consume extra energy. For example, a tenant may hold a weekend meeting and forget to reset the office thermostat after the meeting. Having a solid profile will enable the building owner to recognize that all conditions are still normal outside of this event.

Another step in the iterative process is to identify information that currently is gathered in an unstructured manner, but which has the potential for structured capture in the future. Collection, analysis, and reporting of this type of information will not be easy in the beginning and could derail attempts at simple reporting and automation. If EDM project leaders attempt to automate all data-to-workflow processes in the beginning of the project, the system will likely produce many faulty calls to action. By focusing on simplicity, there is an increased likelihood for maximum user adoption and early success.



Where It's All Going

The future state of energy data management for improved energy efficiency will see complete integration between energy measurement, energy alerts, reporting, and corrective/preventive action. Just as unified messaging enables people to do away with manual message-taking processes, EDM will enable building managers to receive energy data in ways that best suit their unique needs.

Figure 2 below depicts the future state of EDM-enabled property management for maximum energy efficiency. In a quick dashboard check, the building engineer sees the energy consumption details from the last 24 hours. The engineer can see that the HVAC was pushing out abnormally high levels of cold air at 2 am. Viewing the workflow tool in the same view, the engineer also sees that an alert notified the overnight engineer and that the engineer took the appropriate corrective action.

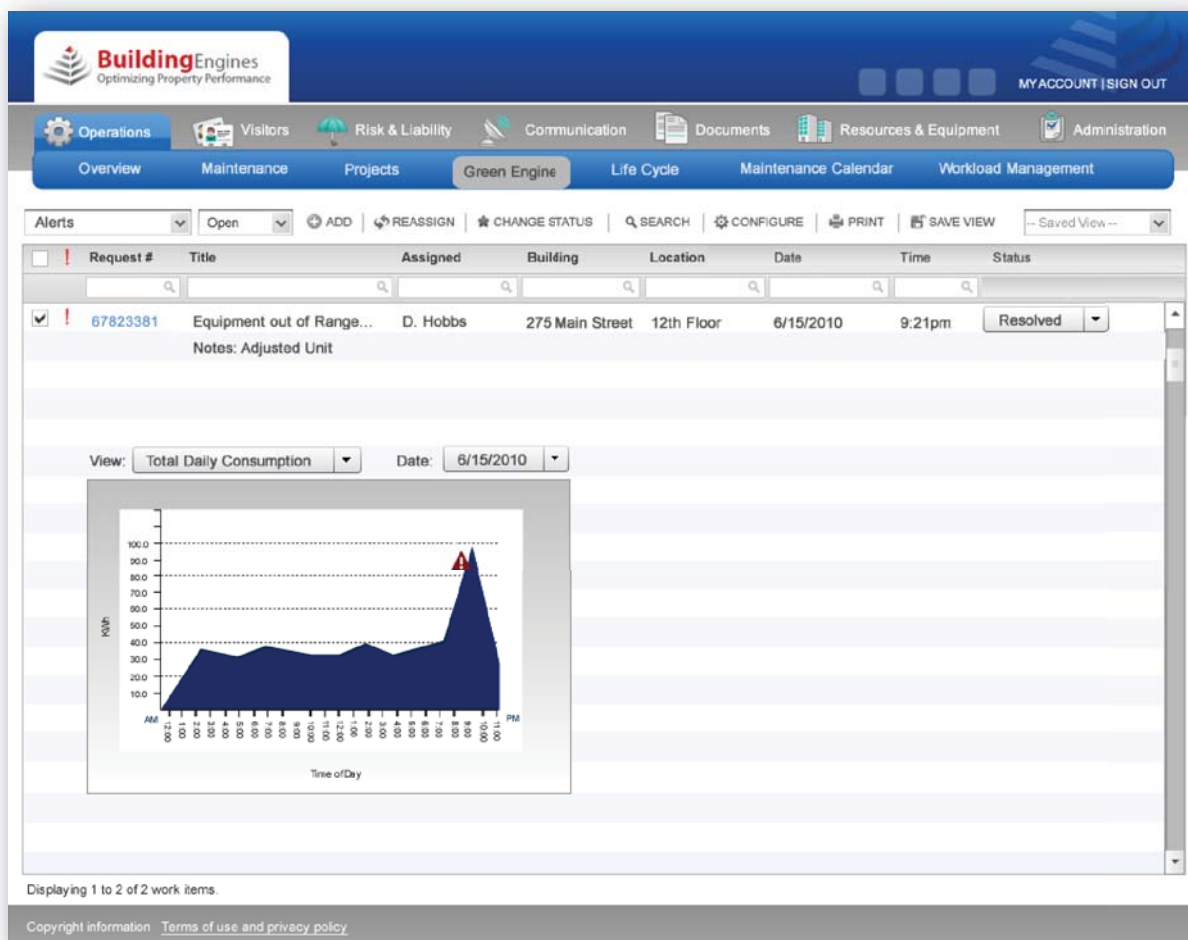


Figure 2: Future State of Energy Data Management

The corrective action and corresponding workflow report are made possible because the system that collects data and produces alerts is integrated with a maintenance and repair workflow tool. Information sent to that tool generates the work orders, and the tool responds by sending the workflow steps back to the dashboard so that the morning engineer can verify that the work was completed. This type of system integration will lead to the future state of EDM and the Autonomous Building.

Conclusion

Building owners that launch energy data management programs can reap big rewards, provided they plan their programs carefully and set realistic expectations, particularly in the early stages. The long-term goal for EDM is to establish a systematic means for capturing energy efficiency data, reporting on it as actionable information, and ensuring that the appropriate corresponding workflows are initiated to ensure that corrective actions and preventive actions are taken.

For organizations seeking assistance with launching their first EDM project, there are many information sources and vendors willing to help. Building owners should leverage these sources to achieve no- and low-cost early EDM success.

To see how EDM is being successfully realized today, view the on-demand Building Engines Webinar, *Energy Management Solutions that Reduce Costs*, at:

<http://be.buildingengines.com/Webinar-On-Demand-Energy-Management-Solutions.html>.

