USENERGYGROUP™

ADAPTIVE ENERGY MANAGEMENT

Optimizing Building Energy Performance

A US Energy Group White Paper

Executive Summary

Energy expenditures account for as much as 40% of a building's operating expense.

Although owners pay close attention to energy costs, there is still a great deal of unnecessary consumption. If they could reduce this unnecessary usage, operating costs would be lower and the bottom line would improve.

But this is easier said than done.

No two buildings are alike. As owners acquire buildings, they end up with different energy monitoring equipment. Traditional energy management systems require specific hardware to monitor energy consumption. If a new building is acquired and has different equipment, owners face the choice of replacing it or devising a way to work with incompatible systems.

The big challenge associated with portfolio-wide energy management is that owners are trying to integrate different buildings, different equipment, and different operating situations. Assembling detailed data from diverse buildings is a huge task, and therefore, many owners try to manage energy usage on a building-by-building basis. Comparing performance between buildings and prioritizing energy projects is difficult.

There is also a resource challenge. On-site staff reacts when there is a complaint or an obvious problem, but they are not trained as energy engineers.

To proactively optimize portfolio energy performance, three barriers must be overcome:

- **Building Disparity** – Diverse buildings and equipment
- **Information Gaps** – Incomplete energy performance data
- **Skills Shortage** – Lack of energy engineering expertise

Adaptive Energy Management provides a solution. It "adapts" to each building, the management team, and the owner's operating policies.

Adaptive Energy Management is based on a technology platform that integrates in-depth data from many buildings despite the fact that they have diverse equipment.

With the right data and advanced analytics, owners find new ways to reduce energy expenditures. Savings of 30% are common, and reductions of as much as 52% have been documented.

A Continuous Opportunity

Energy is always being consumed – 24/7

Without detailed information and the time to analyze it, many owners are forced into a more reactive energy management approach than they would like. For example, the HVAC system gets attention when there is an obvious problem. If no visible problem exists, hidden waste continues because management is not aware of it.

As Figure 1 depicts, reactive approaches to energy management can cause over-consumption. For example, if one tenant complains that an apartment is too cool, the heat in the building is increased for everybody. This causes some apartments to become overheated, and tenants start to open their windows. The building is then further out of balance, and the problem is exacerbated.

Another problem is hidden inefficiencies. Often, unnecessary consumption happens continuously but is not noticed because it doesn't cause a complaint. Some examples of hidden inefficiencies are a water leak, dirty coils, or frequent boiler cycling. Running a building efficiently provides owners with continuous savings on a major operating expense line. Traditional energy management tools provide some help but leave opportunities for maximum savings untapped.

How can owners cost-effectively maximize energy savings across the entire portfolio?

Figure 1: Reactive energy management &hyper consumption

Barriers to Optimized Energy Performance

Energy management boils down to getting comprehensive performance data, understanding what the data reveals, and taking appropriate action. Three barriers stand in the way, as depicted in Figure 2.

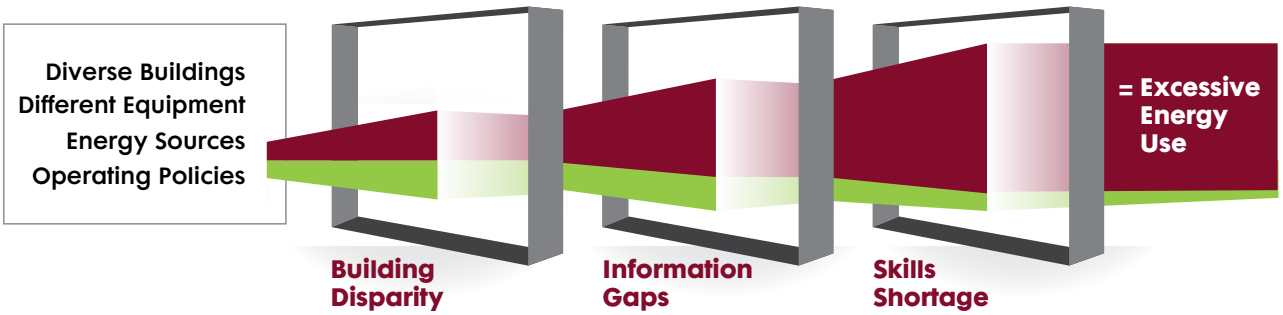

Figure 2: Barriers to optimized energy performance

Building Disparity

The average portfolio contains buildings with different energy management systems and other equipment. Some buildings may have newer equipment, while others have outdated systems.

Installing traditional energy controllers typically requires a significant capital expenditure (payback typically 1-2 years). Therefore, owners typically don't install them in a building that already has one. So, as new buildings are acquired, the buildings in the portfolio have incompatibilities and different capabilities.

Compiling comprehensive data associated with energy management across such a diverse environment is a huge challenge. It can be a time-consuming project, and most owners do not have the time or resources to do it regularly.

Building disparity prevents owners from taking a portfolio-wide approach to optimizing energy usage. As a result, critical issues can be missed and hidden sources of waste are not discovered.

Information Gaps

The availability of data is another issue. Some systems only report basic data, or they limit monitoring to a single system or energy source.

For example, traditional energy monitoring systems may track key building metrics, but may not store the information for very long. This makes it difficult to do historical analyses – leaving an information gap where overspending can go undetected. Traditional systems do not retain data for very long, and they are limited in their ability to report long-term trends and detect unusual situations.

Skills Shortage

People can only act on what they have the time to assess and the ability to understand.

Onsite building personnel have many responsibilities, leaving limited time for energy management. They often do not have the engineering background to comprehend advanced analytics and proactively optimize energy performance.

These barriers make it difficult to optimize building performance and maximize savings.

Owners need a way to integrate data associated with energy usage across the entire portfolio, obtain in-depth analytics that highlight trends and anomalies, and acquire the expertise to proactively optimize energy consumption.

Traditional approaches to energy management do not overcome these barriers. Systems are vendor-specific and limited in scope.

Adaptive Energy Management

Adaptability is the key to optimizing energy performance.

Portfolios will always have diverse buildings with different energy equipment. Owners will always have varying degrees of time and expertise to dedicate to energy management.

A solution that adapts to different types of equipment, different structural factors, and different locations can overcome building disparity. If this solution also gathers comprehensive data, keeps it indefinitely, and provides advanced analytics, it closes the information gaps. Finally, if the solution includes the assistance of human experts, it overcomes the skills shortage.

This concept of adaptability also applies to the needs of different building owners. Some may need hardware and energy management software. Others may only need the software. One owner may have in-house experts who can optimize energy performance if they have the right data, whereas another owner may need managed energy services. A truly Adaptive Energy Management solution must be customizable, so that owners only acquire the products and services they really need.

Adaptive Energy Management combines modern, online software with a cloud-based architecture and managed services to deliver optimized energy performance.

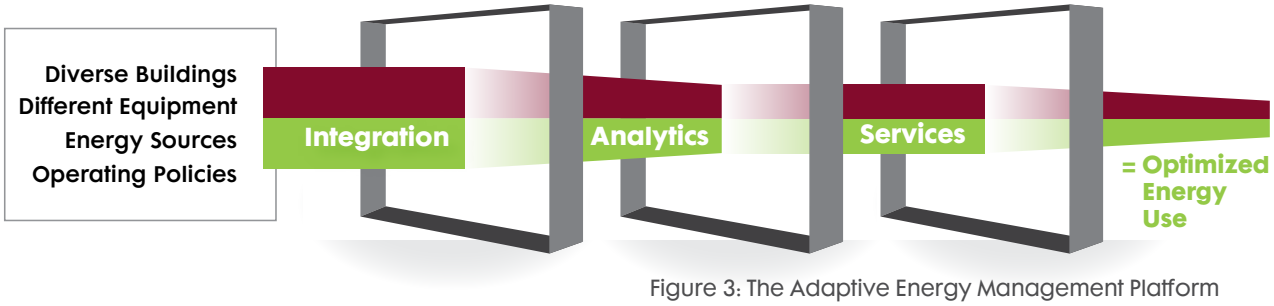

Figure 3: The Adaptive Energy Management Platform

A key innovation is the Adaptive Energy Management Platform. It neutralizes building disparity by accumulating data from different buildings with different equipment and integrating it into the Energy Usage Data Cloud.

Data associated with energy performance is compiled. This comprehensive information is only limited by the capabilities of any preinstalled energy controllers.

As an example of the type of information the system can integrate, it is possible to compile data for all types of buildings, including ones that run on local steam and city steam, and ones which have 1-pipe, 2-pipe, or vacuum systems. It can monitor domestic hot water, as well as the water feed to the boiler. The system can also track oil deliveries for reconciliation with supplier bills.

The Energy Usage Data Cloud is an increasingly valuable resource that closes information gaps. It optimizes the data for analysis by storing it in an advanced way so that different variables can be compared quickly. Owners can receive in-depth energy alerts via a web dashboard or a mobile app.

Actions are facilitated in two ways. First, automated actions are made via conditional logic built into the software. For example, owners can identify specific set-points to determine when the boiler is placed on bypass. Second, human experts in energy efficiency review the data and identify opportunities to save more.

An energy action rules engine enables owners to customize energy management for each building. Owners can "program" rules for energy actions based on unfolding conditions and equipment status. Buildings become self-optimizing in energy consumption.

Human specialists are the "last mile" of building energy management. There will always be issues that can only be recognized by energy specialists. These issues are often the hidden ones which, when addressed, deliver significant savings.

Traditional energy management systems include hardware and software, but they do not provide the expertise for deep analysis that can maximize energy savings. Most onsite managers do not have the time or training to work with comprehensive analytics. This skills shortage means that many opportunities to save on energy expenditures will be lost.

An Adaptive Energy Management solution includes an energy operations center staffed by experts who operate as an integral part of the building management team. They evaluate energy performance, intervene when appropriate, and ensure that energy savings are maximized.

Conclusion

Traditional energy management systems deliver benefits, but they leave gaps in serving diverse building portfolios and organizational teams. Every gap is an opening for wasted energy consumption and higher operating costs.

Adaptive Energy Management closes those gaps with a hardware-agnostic platform, web-enabled analytics, energy action rules, and human experts who augment the owner's team. Owners obtain the mix of hardware, software, and services appropriate to their needs.

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