

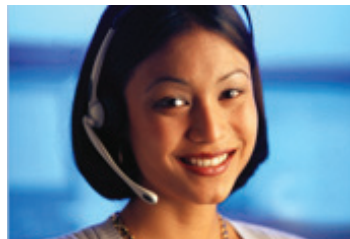
Best Practices in Energy Management For Chain Retailers

White Paper

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How to Gain Enterprise-Wide Control of Your Facilities to Reduce Costs and Carbon Footprint



The Challenges

Retailers face multiple challenges in today's economy, not the least of which is managing energy usage. Energy costs are skyrocketing, with commercial electricity prices up more than 80% since 2000. Even so, today's rates don't fully reflect the recent cost increases for the underlying commodities (primarily coal and natural gas). Soon enough, however, utilities will have to pass on the cost burden to energy consumers — and with nearly 900,000 locations, U.S. chain retail stores are among the largest commercial consumers of electrical power.

Of course, a tightening economy affects more than just the business sector — cost-conscious consumers hold their wallets close, and customer loyalty is taking a hit. Customer satisfaction, comfort and the in-store experience are more important than ever and are often associated with higher operating costs.

CEO's around the world are starting to see the shape of a new era of sustainability coming into view. In the face of rising global competition, technological change and the most serious economic downturn in nearly a century, corporate commitment to the principles of sustainability remains strong throughout the world: 93 percent of CEO's see sustainability as important to their company's future success.¹

Sustainability is taking center stage in the retail industry. But it can be difficult to discern which initiatives lead to real sustainability and are simply "greenwashing." Consumers are

demanding "greener" products and facilities, and many investors are expecting corporations to document and report their carbon emissions. This leads many retailers to highlight their green initiatives very publicly (see Figure 1). At the same time, companies are hesitant to make green investments, which may take five years or longer to pay back — assuming they pay back at all!

Retailer Sustainability Examples

Kohl's is completing the largest rooftop solar project in U.S. history.

Michaels has reduced CO2 emissions by 192 million lbs through energy management.

Nike plans to be carbon neutral by 2011.

All of these factors have caused retailers to take a closer look at ways to reduce store-level energy costs, without negatively impacting customer comfort. The benefits are obvious. But the myriad of alternatives and the lack of a well-defined "roadmap" to energy efficiency have overwhelmed many companies, often creating corporate inertia on the issue at a time when many can least afford it.

¹A New Era of Sustainability: UN Global Compact-Accenture CEO Study 2010

Best Practices in Energy (continued)

Where to Start?

There are three prominent options for quickly reducing energy costs across a chain:

- Green building techniques
- Equipment replacement/retrofits
- Energy Management Systems (EMS)

Each of these options has specific benefits, capital costs and ROI:

Green building techniques

Green building has become a priority for many new facilities. There is a wealth of information and resources available in this area, notably from the U.S. Green Building Council (USGBC) with their popular LEED (Leadership in Energy and Environmental Design) certification². There is typically some upfront cost increase associated with green building, but as the construction industry has gained familiarity with these techniques, the cost differential has started to fall rapidly. The biggest downside in impacting current operations is that green building practices do not impact the energy consumption across all existing facilities. With new store openings projected to slow, the ability for green building techniques to impact overall energy costs is further diminished.

“Energy efficiency is “the cheapest, the cleanest fastest energy source.”

*— White House web site
January 21, 2009*

Equipment replacement/retrofits

To increase the efficiency of their current locations, Retailers can consider several categories of equipment replacement and installation initiatives, ranging from rooftop solar to HVAC upgrades, lighting retrofits, and skylights. All of these options should be considered as part of any comprehensive energy management strategy. The capital investment and energy savings generated by these projects vary widely. But where utility rebates are available, paybacks generally range from two to five years. Of course, researching, filing required reports and collecting rebates is a time consuming process that varies from one utility district to the next.

Energy Management Systems

For nearly all retailers, therefore, the most significant “low hanging fruit” for reducing energy costs across all locations, new and existing, is implementation of an enterprise-wide Energy Management System (EMS). The level of capital investment is relatively low. Better, yet, payback for the best systems occur in 18-24 months.

Although variations of this technology have been available for years, deployments still remain low across the retail industry and usually involve solutions that have shortcomings, especially for the multi-site operator. Only 42 percent of retailers have deployed any form of energy regulation equipment in their stores. (Figure 1)

Further exacerbating the situation, many retailers have not developed a strategy for actively managing the EMS units they have deployed and instead follow a “set it and forget it” approach. This often quickly degrades the savings they might have

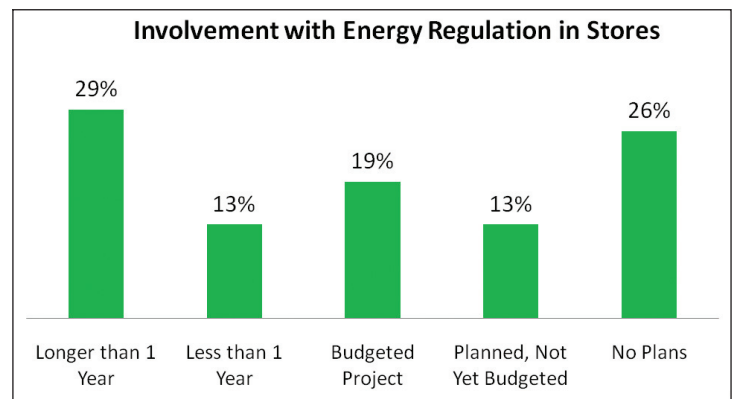


Figure 1. (Source: RSR Research, “What Can Green Do For You?”)

experienced, as changes in equipment, operating procedures, routine maintenance, and personnel behaviors negatively impacts energy costs, in addition to store brand and customer comfort, if not managed properly.

This white paper examines “best practices” for controlling energy usage for multi-site retail chains. It highlights a series of proven, successful steps that winning retailers have taken to reduce costs, improve customer comfort and demonstrate sustainability across their enterprises.

²For more information, visit <http://www.usgbc.org/leed/>.

Best Practices in Energy (continued)

The Energy Management Maturity Model

Best practices associated with the successful implementation of energy management systems can be categorized into four levels of operational maturity, illustrated in Figure 2:

The remainder of this paper will examine these phases and outline critical success factors for each.

	Typical Timing	Add'l Savings
Level 4 Continuous Improvement Integration with Operations, Design, Finance and Procurement functions	28-36 Months	+5%
Level 3 Load Management Demand Response, integration with preventative maintenance, HVAC vendor integration	15-27 Months	+5%
Level 2 Improve/Optimize Asset Management Tailor standards, Demand Control Ventilation, HVAC vendor training, remote HVAC diagnostics dispatch prioritization	7-14 Months	+5%
Level 1 Standardized Control Establish corporate set-point & schedule standards, HOA on-Compliance Site Poll Fails and Device Poll Fails	0-6 Months	15-17%

Figure 2. The Energy Management Maturity Model

Best Practices in Energy (continued)

Phase 1: Standardize Control

The first step in implementing an EMS is to standardize control of energy consuming devices with centralized visibility into the exceptions across all sites. (Figure 3)

Ideally, an EMS ensures that all energy usage is tied to employee and customer comfort, eliminating energy consumption without business benefits. The best methods for doing this while minimizing overhead costs are summarized below:

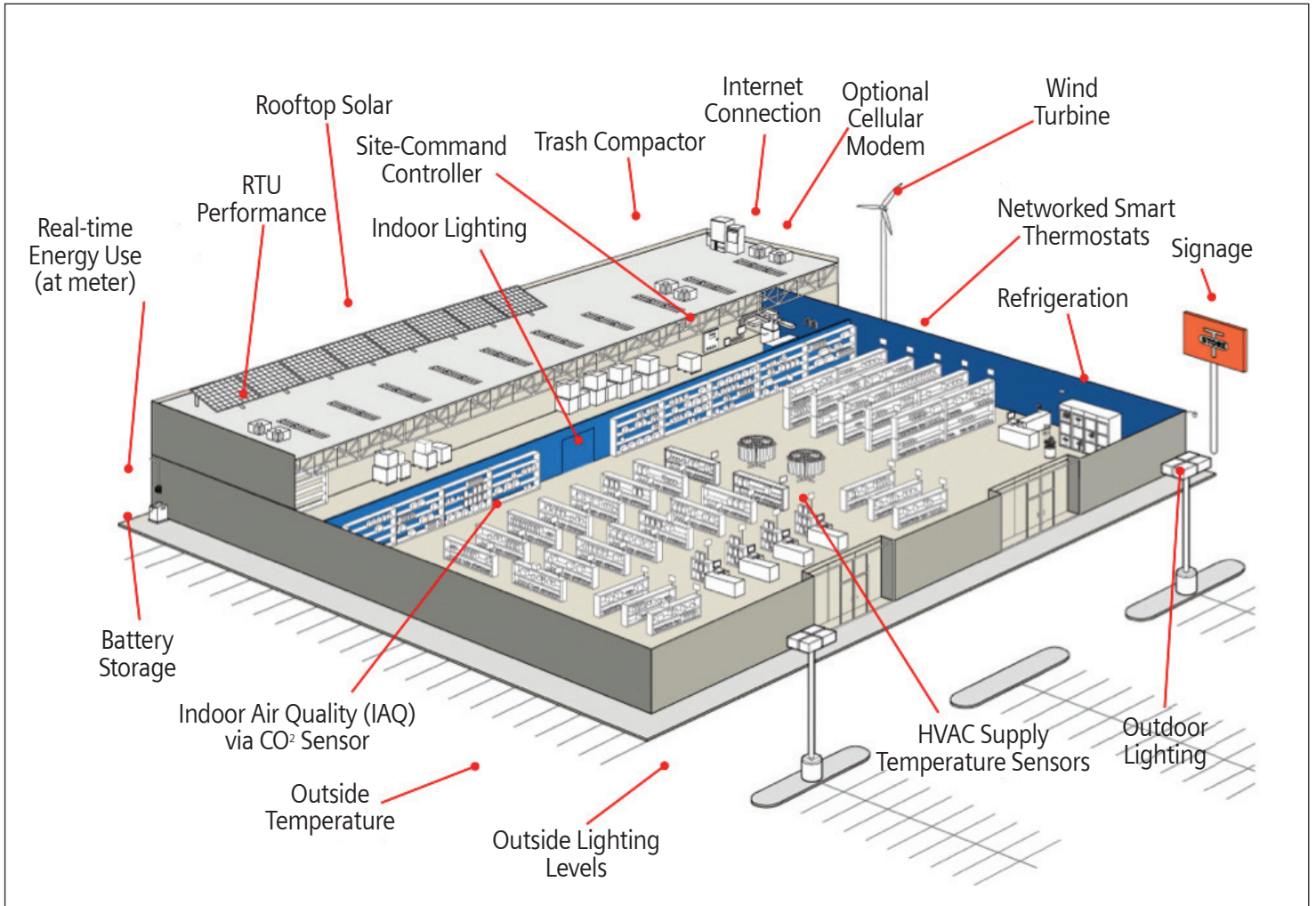


Figure 3. Effective energy management begins with on-site monitoring and control of key energy-consuming devices within each retail facility.

Best Practices in Energy (continued)

Schedule Consistency

An enterprise-level EMS helps insure consistent schedules for lighting, appliance and HVAC control, tying energy use to employee and customer occupancy. Energy used to heat and light empty buildings can be saved. Exterior light levels are related to store-hour schedules to minimize power use while providing exterior lighting needed for safety and accent lighting for brand enhancement.

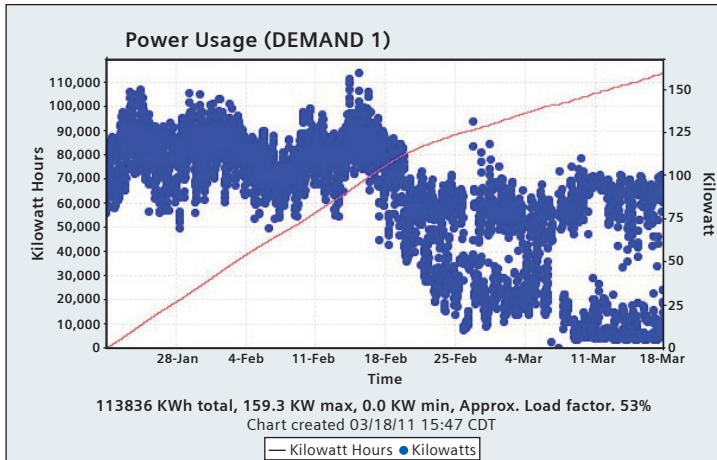


Figure 4. This chart shows the effect of standardized lighting controls on reducing store-level energy costs. HVAC controls were implemented on Feb 18. Lighting controls on March 10. Both daytime peaks and nighttime lows were significantly reduced.

Schedule Granularity

To help enforce schedule consistency, a good EMS splits circuits into multiple categories, for more “granular” control. This limits the operation of lighting and appliances such as TV monitors, saunas and spas as necessary based on building occupancy. For example, at big box electronics and health clubs, schedule granularity is a significant driver of cost reduction by reducing “vampire load” from plasma TV’s by keeping them in the off position after hours, and by allowing separate control of spaces with infrequent use such as spin rooms.

Schedule Overrides

It is important that the EMS provide for local overrides, usually by means of a switch attached to the EMS controller unit, or mounted at the manager’s desk. Smart systems will limit the duration of each override based on pre-determined values set by corporate headquarters. These limits not only ensure minimal negative impact on energy savings at the moment but discourage outright disabling of the system.

Temperature set point standards

Energy savings for HVAC mainly involve reasonable heating and cooling set points across the chain, designed to minimize waste while respecting customer comfort. These standards will vary based on the climate and the type of retailer. For example, in a

convenience store the average customer visit is only a few minutes. So the inside/outside temperature differential affects comfort perception more than absolute temperature — therefore set points might be relatively higher. The impact of even a single degree change in set points can provide hundreds of thousands in savings when implemented consistently across a chain (See sidebar, “What’s one degree worth?”).

Set point overrides

As for schedule overrides, it is important to allow store managers with real-time control to deviate from corporate standards if necessary. But to prevent abuse, each override should be limited to overrides from impacting energy savings, each setting is configurable for a temperature range (e.g., user may change set point +/- 2 degrees) and a time period (e.g., each override lasts 1 hour). Of course, inordinate use of overrides or outright disabling of the system would be detected above the site and reported to the appropriate manager.

Normal operation:
MOD light on and COM light flashing every 60 seconds

Temporarily raise temperature
Temporarily lower temperature

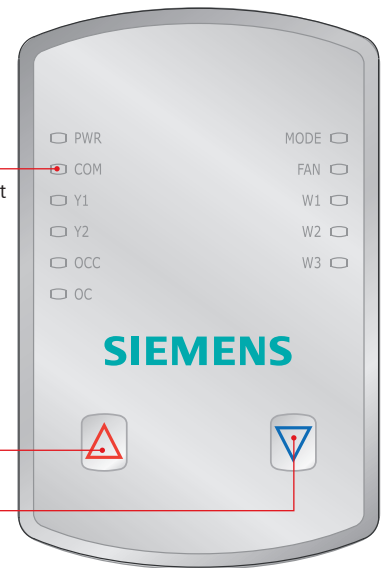


Figure 5. By replacing conventional thermostats with digital zone controllers, an intelligent EMS moderates energy use while providing store managers temporary overrides over set points for a predefined period

Daylight Harvesting

Many retailers with large storefront windows can “harvest” daylight, by using ambient light and temporarily dimming in-store lighting. The Lighting Controls Association reports, effective daylight harvesting has been demonstrated to save energy and increase the quality of the visual environment, reducing operating costs while improving user satisfaction.³ An intelligent EMS may integrate an optional daylight sensor that will partially or fully turn off area lighting when natural lighting suffices. Shoppers are happy, and retailers get a big break on their monthly energy bill.

³DiLouie, Craig. “Why do Daylight Harvesting Projects succeed or fail?” Lighting Controls Association, March 2006. http://www.aboutlightingcontrols.org/education/papers/daylight_harvesting.shtml

Best Practices in Energy (continued)

Demand Control Ventilation (DCV)

Industry and government standards for outside air intake are generally based on building occupancy. Most building designs comply with these standards by setting HVAC systems to draw outside air as if the building were fully occupied, regardless of actual occupancy. This requires energy to cool and dehumidify the excess outside air. A good EMS features “Intelligent Demand Control Ventilation,” which controls the outside air intake based on occupancy. This saves significant energy in both cooling and heating seasons and reduces HVAC equipment wear and therefore maintenance costs. For a detailed discussion on this topic, please see the white paper Intelligent Demand Control Ventilation, available on the Siemens website.

The Importance of Enterprise-Level Tools

Even though a store manager and their staff might be diligent in managing energy use at a particular store, it is a challenge to maintain consistent employee behavior throughout a chain — even the most motivated employees will miss items, resulting in higher costs. This might involve training and maintaining awareness across thousands of employees with high turnover! By automating the key elements of energy control and providing centralized visibility to exceptions, energy management systems can ensure such consistency across the enterprise. This eliminates the risk of employees actively disrupting potential cost savings, or letting failed equipment continue to waste energy. Enterprise level visibility and control is a very powerful tool, which actually frees store managers and hourly employees to focus on the very customer service these economic times demand.

Phase 2: Asset Management

The second phase of the process is leveraging the on-site controls established in Phase 1 to more effectively manage the condition and operations of the physical equipment. The key objectives here are to maximize equipment efficiency and to minimize unnecessary mechanical wear and downtime. While this is often a secondary consideration in the ROI calculation, the cost reduction can be substantial. One nationwide retailer documented year over year cost reductions of 14% — more than \$1,900 in savings per store annually. Key techniques in this phase include:

Failed HVAC Identification

Industry studies show that 24-39% of roof-top HVAC units have performance issue.⁴

That means for a store with multiple RTUs, odds are that one or more of them is in some sort of failure mode or performing sub-optimally at a particular time. Other units serving a shared space will overcompensate, so store managers and customers rarely notice. Thus, failed HVAC units typically drive up energy and maintenance costs without any customer benefit — usually for months, sometimes for years. An effective asset management strategy includes the ability to generate reports to identify exceptions, even for thousands of HVACs. Minimally trained staff

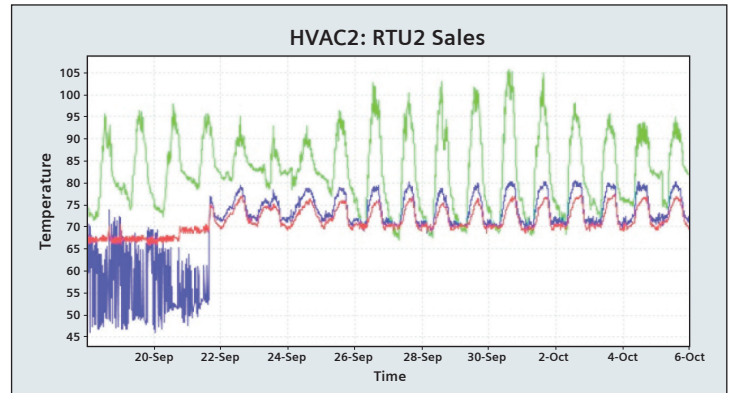


Figure 6. This chart shows an HVAC unit that has quit cooling – note the supply temperature matches the zone temperature after September 22. Remote diagnosis and reset/disablement of units can avoid wasted energy and mechanical wear.

can instantly see all the issues across the enterprise and apply the company’s limited resources to create the most value. (Figure 6).

Failed HVAC Disable or Reset

For failed units, it is important to be able to call for a remote system reset, which might allow the unit to continue functioning until the next preventive maintenance call. If this does not work, the EMS should provide remote diagnosis and shutdown if necessary, saving energy and possibly averting compressor replacement. By combining remote system diagnosis with remedial action, significant maintenance and energy cost savings can be achieved.

Repair Validation

Remote visibility also allows verification that service work has been done and done properly. Chronic problems with a particular unit can be identified. And the remote record may even indicate whether maintenance should be covered under warranty (e.g., the equipment was never installed properly).

Extended Visibility

Related to repair validation is the ability to provide service providers with system login rights (with appropriate access controls and firewall protections). Depending on the retailer’s relationship with its contracting network, such visibility can result in a true win/win situation. For example, the maintenance vendor can use the system to determine which items require immediate dispatch and which can wait until the next preventive maintenance visit. Such strategies can reduce costs and improve performance, resulting in greater margins for both parties.

Identify Failed Sign Lighting Circuits

Most features of an EMS involve cost reduction. But by monitoring lighting circuits and detecting potential signage failures, such a system can ensure that a retailer’s proper brand image is maintained.

⁴Small HVAC Problems and Potential Savings Reports, California Energy Commission, October 2003.

Best Practices in Energy (continued)

Identify Failed General Lighting Circuits

During lighting system service or extended operating hours, the staff often must force ON the lights. The EMS can prompt site staff to reverse the override the next morning and avoid lights being on 24x7 for an extended period.

Identifying Design Anomalies

Standardizing control often allows detection of poor system design. For example, one leading pet supply retailer had a 12-ton HVAC unit serving only a pet grooming room. The minimum run time on the unit was set at 10 minutes. When the unit called for cooling, the zone temperature would quickly drop below the heating set point. After a 10-minute change over delay, the space would be quickly heated past the cooling set point and the cycle would repeat. The wasted energy, staff discomfort and equipment wear caused by this condition were quite substantial but were soon alleviated once the problem was identified.

Real-time energy data

Utility meters are accurate only if properly installed and even then, they generally provide only two pieces of data, peak kW and kWh, and these are usually received by operating managers too late to be actionable — generally 45 to 60 days after a period ends. So whatever goes awry on a site almost always results in a higher peak kW or daily kWh. Using a utility-grade real-time meter with an EMS logs each site's unique energy usage. Above site, the EMS system can analyze all locations for their usage patterns as changes occur, identifying potential problems and

highlighting favorable or unfavorable comparisons that might need further attention.

Utility billing errors

Utility bills often contain errors. For example, there have even been cases when retailers received refunds of as much as \$250,000 for chronic overcharges. Many such errors are cumulative and may not be found for years, if ever. With its integral, accurate metering, an EMS facilitates a detailed audit against utility bills, revealing the amount of any error, often leading to substantial rebates.

An automated EMS with above-site visibility, combined with a disciplined process for routinely monitoring exceptions and identifying resolution paths. By employing such a system retailers can more efficiently manage hundreds or thousands of sites to reduce energy and maintenance costs while assuring a consistent and comfortable customer experience.

Phase 3: Load Management

The first two phases of energy management aim to impose consistency across sites and more effectively control energy usage over time. Load management, on the other hand, involves strategies to reduce energy load for a specific period, usually hours in a day. This is illustrated in Figure 7 below:

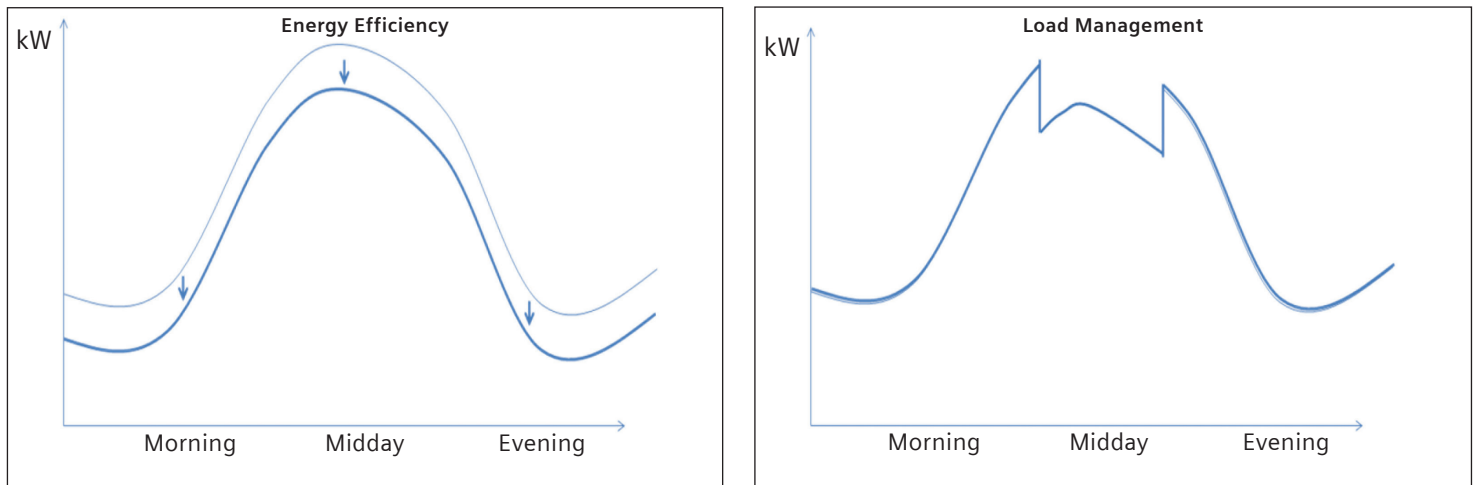


Figure 7. These graphs illustrate the difference between energy efficiency, which involves shifting the entire energy usage profile downward versus load management, which involves reducing demand during defined windows of peak usage.

Best Practices in Energy (continued)

Background: Demand Response and the Need for Load Management

It is widely accepted that deficiencies in the U.S. electric grid are creating serious reliability issues with our electricity supply. This is evidenced by the frequency of widespread blackouts our nation has experienced in recent years. Also, electricity supply has not kept pace with demand as building of traditional generation and transmission facilities, including nuclear, has been limited by financial and other constraints.

The Federal Energy Policy Act of 2005 established demand response as an essential element of a healthy electric grid. DRAM, the Demand Response and Advanced Metering Coalition, defines Demand Response as “the reduction of customer energy usage at times of peak usage in order to help address system reliability, reflect market conditions and pricing, and support infrastructure optimization or deferral.”⁵ Many utilities have long had programs to pay retailers for these reductions. But most such programs were executed via “sneaker net,” whereby managers manually raise set points or flip lighting breakers to curtail usage. The benefits have been inconsistent, at best; as retailers have reported unhappy customers and utilities have had trouble verifying claimed load reductions.

Intelligent Load Management™

To successfully capitalize on the economic and environmental benefits from Demand Response, forward-thinking retailers are deploying “Intelligent Load Management” (ILM) technologies integrated seamlessly with their energy management systems. These automated, verifiable solutions eliminate the need for human intervention within the facility. Additionally, ILM allows chain retailers to participate in automated demand response programs, which are valued more highly by utilities and as a result, often awarded higher incentive payments.

ILM aggregates cutbacks across multiple sites in a given market, yielding better results with less impact on site conditions. A variety of methods are used, including cycling HVAC units, increasing air conditioning set-points, turning off areas of lighting, and controlling the use of other energy-intensive processes. When a demand response event occurs, ILM polls every enrolled site and takes out the least-consequential load first. This often allows chain retail sites to participate in a demand response event without anyone within the facility even noticing.

ILM also allows retailers to set specific business rules for their demand response event participation. These rules allow retailers to decide what devices within their facilities they want to include based on the severity of the grid event. ILM sites are continuously monitored to ensure that conditions stay within the mutually agreed upon limits, including maximum building temperature, maximum CO2 concentration, and minimum lighting levels. This protects both a retailer’s ability to do business and their corporate brand.

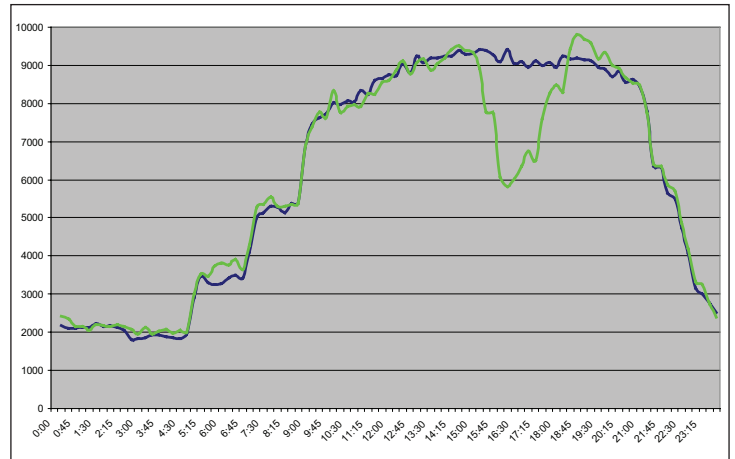


Figure 8. This graph shows the load reduction achieved by 100 retail locations during a recent Demand Response event in Texas. The blue line shows aggregate energy demand the day prior to the event, while the green line shows demand on the day of the event. In aggregate, these sites achieved a 21 percent load reduction over 3.5 hours, all with no material negative consequences to the customer experience.

Phase 4: Measure, Manage and Communicate

This phase of the Energy Management Maturity Model involves establishing measurement and communications processes to ensure the gains of the previous phases are sustained and expanded over time. The key is to incorporate energy management into on-going business processes versus treating it as a one-time event.

There are four critical steps in this phase:

- Enterprise exception reporting
- Continuous savings validation
- Communication planning
- Extending the platform

Enterprise Exception Reporting

A significant portion of the energy savings results from identifying and resolving HVAC performance issues in a timely fashion, as described in Phase 2: Asset Management. While it is possible to do this manually across a small number of locations, as the number of locations grows beyond 20-30 units, this simply becomes overwhelming for facilities management teams. There are too many exceptions to handle without some form of automation.

Even with automation, however, this process must still be managed properly to remain effective. For example, an alarm-based “push” approach, with each EMS pushing alarms out to the

⁵Definition from the Demand Response and Advanced Metering Coalition (DRAM)

Best Practices in Energy (continued)

network, will quickly inundate employees with meaningless or redundant information. Traditional EMS requires setting very specific alarms for each condition on each device. For example, an alarm for low supply temperature is defined in each roof-top unit locally. Each RTU has at least 10 such separate alarm conditions. If each location in a 100-unit chain has 12 RTU's, there are 12,000 potential alarm conditions at any given time. Even further, alarms are usually set to re-generate on a regular basis (typically between one and six hours). So many of the alarms are simply repeat notices of the same problem.

In practice, this approach quickly leads to data overload and “the boy who cried wolf!” syndrome, whereby all of the alarms (meaningful or not) are discounted, turned off or simply ignored due to the enormous volume generated. Many EMS projects begin with the best of intentions with a few sites or pilot sites. This works well as long as the original champion is still in place. However, when the number of sites reaches somewhere between 50 and 100 the burden of maintaining thousands of configurable ‘points’ and reacting to the alarms becomes overwhelming, it is quite common to see these programs stall out and fail. Initial results can be stunning, with energy savings of over 20% combined with lowered maintenance expenses. But managing the solution (hardware software and processes) is just not scalable beyond 100 sites.

A better approach is to store and manage all of the key site metrics in an “above site” data center and to process it there. Urgent issues are automatically identified and accumulated in exception reports upon a manager’s request. Managers can view enterprise dashboards or generate web-based reports to quickly and easily spot exceptions across all sites and compare sites against each other to identify outliers. Since all of the information required to identify an exception condition resides in a hosted server, highly tailored reports, dashboards and Key Performance Indicators (KPIs) are available on-demand.

Reports and dashboards not only identify issues, but provide drill-down capability to diagnose the root causes and potential solutions. Proper reporting can distinguish urgent exceptions

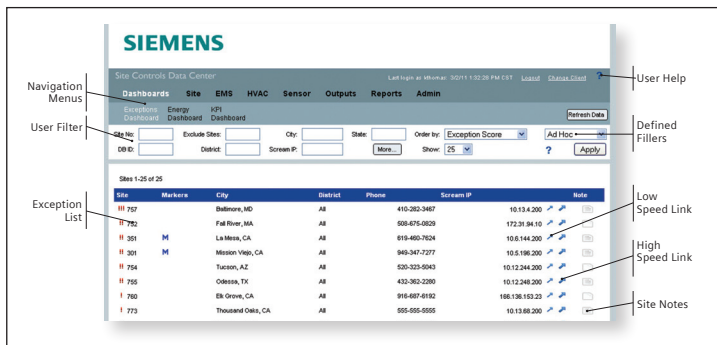


Figure 10. Example of Exceptions Dashboard

(based on how the customer’s processes define ‘urgent’) and limit these to a manageable percentage, typically less than 2 percent. In a centralized database application, the false alarm rate is driven to near zero. At this activity level the solution becomes scalable with minimally-skilled employees, who have confidence in the solution and work with highly-actionable information. This allows companies to successfully manage large EMS deployments which bog down alternative approaches.

Continuous Savings Validation

“What have you done for me lately” is a common sentiment, and energy management is no exception. To gain needed executive support, energy and facilities teams must continually validate and document the savings generated by the system and report those findings to management on a regular basis. The first step in savings validation involves a detailed

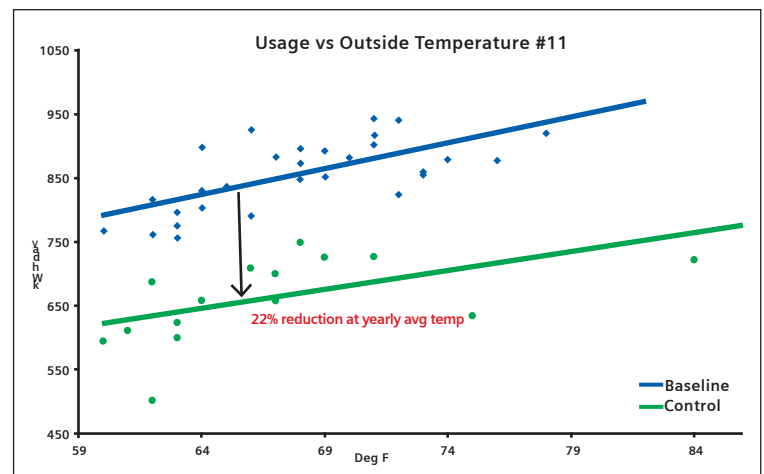


Figure 11. It is important to isolate the effects of variables such as outside temperature and store operating hours when calculating the energy reductions achieved by EMS using advanced techniques such as linear regression.

Measurement and Verification (M&V) process for a sample of pilot locations. These results are then analyzed to determine the level of energy reduction to be expected in a broader rollout. There are multiple factors that impact energy usage during an M&V test period, including weather, store operating hours, HVAC equipment failures/maintenance, and physical changes to the building. It is crucial to use the proper analytic tools to isolate these effects and provide a true picture of the EMS impact. This empowers internal teams to present a defensible business case to senior executives, hopefully justifying the investment for wider deployment.

While the initial M&V process provides a good starting point, the measurement process should not end there. Successful organizations implement regular performance reviews for all activities and this should be no different for an EMS solution. Key metrics include kWh usage reduction for a few new sites each year, highest kWh per square foot (within a climate zone), highest

Best Practices in Energy (continued)

kW during setback, mean time between repair of failed HVACs, excessive use of overrides by staff, set points and schedules that don't meet corporate standards. Top quartile/bottom quartile tracking of energy use helps identify which regions are doing a particularly good job of energy management vs. those which need improvement. Specific diagnostic reports can assist in identifying root causes for high energy use. These include set point exceptions, which allow facilities executives to quickly identify which sites have deviated from corporate standards, or as HOA reports, which facilities indicate whether lighting override switches (Hand/Off/Auto) have been set incorrectly, allowing lights to run all night.

Other metrics to track include:

- Maintenance spending (by store, region, chain)
- Equipment failure trends
- Operations — EMS system override requests
- Operations exceptions — top/bottom 10 sites

By continually tracking these metrics, trends (whether positive or negative) can be identified and corrected quickly. Additional savings opportunities (such as demand control ventilation or lighting retrofits) can be planned, and corrective practices can be implemented. The net result is that energy management stays top of mind within a broad constituency across the organization, maximizing energy savings and value creation.

“A global effort to boost energy efficiency with existing technologies could cut more than 20% of world energy demand by 2020.”

— *McKinsey Global Institute*

Communication Planning

Retailers often underestimate the importance of communication in maximizing the value of their energy management program. But a sustained communication campaign can reap significant ongoing and incremental benefits year after year — both internal and external.

Internal: Employee Communication

Studies show that employees prefer to work for companies that are environmentally conscious. This is particularly true with younger workers, who comprise a large percentage of the retail workforce. Regularly publicizing the environmental impact of energy management efforts can positively impact how employees feel about working for a particular company, enhancing retention. For example, a retailer could spotlight energy reduction initiatives in internal employee newsletters, comparing the savings to equivalent number of trees planted or cars removed from the road. (For this and other calculations, visit www.usa.siemens.com/emsenergycalc). Additionally, if employees believe that their company truly cares about sustainability, they are more

Through a process of continuous improvement, Michaels has:

- Cut energy usage by 137 M kWh annually
- Reduced CO2 emissions by 192 million lbs.
- Removed 17,400 cars from the road for 1 year
- Powered over 12,900 households for 1 year

likely to exhibit sustainable behaviors on the job, further enhancing the impact on the retailer's carbon footprint as well as its bottom line.

Companies can also use the management dashboards described above to create friendly competition between districts or regions. Leading retailers regularly distribute energy use figures by region, encouraging regional managers to leverage the above-site EMS capabilities to effectively control costs across their stores. Reporting each region's performance versus its peers (and having those results seen by executive management) can be a powerful tool for change. Case studies can also be published in company newsletters that highlight a new lesson learned, or best practices or do's and don'ts from the company's own experiences.

External: Green Branding

Today's consumers want to know that the corporations they do business with operate in an environmentally-friendly manner — and they are rewarding sustainability with their pocketbooks. 46% of consumers say they would shop at a retailer more if it was environmentally friendly, while 47% say they would pay more for environmentally friendly services, products or brands.⁶

Retailers report that their purchased utilities (electricity and gas) account for as much as 85% of their total carbon footprint. With EMS implementations that can deliver chain-wide energy reductions of 20% or more, **a company's carbon footprint reduction can easily exceed 17%**. For companies making



⁶Maritz Poll: Environmentally Friendly Retail Marketing — All Hype of Consumer Preference?

Best Practices in Energy (continued)

investments in purchasing alternative energy (often at much higher prices than conventional sources), energy management can have a greater impact on emission reduction. Additionally, energy efficiency provides “green power” with none of the downsides of wind or solar, such as reliability issues, transmission requirements, community aesthetics, and higher costs.

Given the substantial environmental impact of energy management, combined with the high degree of consumer interest, leading retailers are actively publicizing their energy management initiatives. Public relation strategies include in-store signage, customer newsletters, press releases, case studies, mentions within the sustainability section of the corporate web page, and even a paragraph in the annual report. These branding benefits can be substantial, while the incremental investment is extremely low since the project has been funded through predictable, dependable cost savings.

Extending the Platform — Energy Savings

Once the ‘low-hanging fruit’ of standardized controls, asset management and load management have been deployed and managed, companies can achieve further savings by implementing some of the newest innovations in EMS units, including Psychrometrics, Global Enthalpy and Runtime Balancing.

Psychrometrics. Psychrometrics refers to the idea of considering both indoor air temperature and humidity in controlling HVAC operation and set points. Our comfort is in large part a consequence of not just air temperature, but (because we cool ourselves via perspiration) the extent to which that air is saturated with water vapor. Psychrometrics is the control of a space with lower energy cost by considering humidity or other properties, along with the simple dry bulb temperature at no net effect to the occupants’ comfort.

Global Enthalpy/Economizing. Although economizers have been around for some time, when some HVACs have full economizers in various states of repair there is the risk of specific units operating inefficiently or actually defeating the savings of other units. Further, the vast majority of HVACs only have fixed outside air dampers. For these units only maximum occupancy conditions or cool dry outside air conditions allow for near optimal performance. By centralizing the economizer sensing and control functions at the site level and monitoring trends above site, global control, error detection and optimization can occur at a reasonable cost and maximum energy savings.

Runtime Balancing. For HVACs “it’s the miles, not the years” that drive both asset life cycle cost and energy efficiency. Uneven runtimes among HVAC units that serve a common space is legendary — but preventative maintenance visits are on a fixed schedule. Runtime balancing reduces maintenance and energy costs, as well as capital replacement cost, by narrowing the gap between high and low runtime HVACs serving a common space. Longer runtimes mean more air through a unit, causing filters to clog and fan belts to wear out faster, decreasing overall efficiency. By coordinating system operation at an overall site level, HVACs that serve common spaces can have more evenly balanced runtimes — lowering maintenance costs, increasing energy efficiency and optimizing asset performance.

Extending the Platform — Business Intelligence

While not strictly tied to the topic of energy and maintenance management, many leading retailers have expanded the use of their EMS to monitor a host of other on-site devices and parameters. This includes devices related to energy (rooftop solar and wind power), but also devices that are of more interest to merchandising and marketing groups, such as traffic counters. Companies can easily justify the incremental investment if the basic infrastructure has been funded via energy and maintenance savings. Devices monitored by a broader facilities intelligence platform can include:

- Rooftop solar panels
- Traffic counters
- Gasoline dispensers
- Refrigeration and freezers
- Irrigation systems
- Product quality and freshness
- Trash compactors / cardboard balers
- Water temperature, pressure and usage
- Humidity and light levels
- Indoor air quality measurements
- Specialized product inventory
- Rooftop wind generation
- Security systems
- Process exhaust fans
- Water chemistry
- Soda dispensers

Each of these devices or parameters can be tied into business processes to eliminate inefficiency and improve service, creating additional value beyond the energy savings generated by the EMS.

Best Practices in Energy (continued)

The Road to Sustainability — it is a Process, not a Project

Now more than ever, energy management is a critical tool to help retailers deal with multiple challenges impacting profitability — rising energy prices, repair and maintenance expenses, declining customer loyalty, grid stability and environmental concerns. Fortunately, energy management addresses each of these issues while delivering immediate and measurable bottom line impact.

But long-term success in energy management involves much more than installing in-store technology. Rather, the most effective companies are taking a comprehensive approach combining hardware, software, business operations, efficient communications and continuous improvement strategies to create value across their extended enterprise. It is crucial for companies to understand that effective energy management is a process, not a project, and must be sustained over time. With a modern EMS solution this process can be sustained, while delivering a rapid dependable ROI and reducing other overhead costs that were previously considered fixed. By regularly analyzing a set of Key Performance Indicators (KPIs) reflecting asset

conditions and operational performance, retailers are able to proactively identify high-consumption energy outliers and deal with them effectively, preventing energy waste and maintaining a comfortable shopping experience.

“The absolute cleanest form of energy is the energy that is never used.”

— Sierra Club Website

By following the strategies suggested in this white paper, retailers can monitor and control store assets and enable visibility across the enterprise, generating significant economic and environmental benefits while keeping their most valuable asset — their customers — comfortable in their stores.