BEST PRACTICE GUIDE TO MAXIMIZE ROI OF ENERGY MANAGEMENT SYSTEMS

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Once your organization has made the investment in an energy management system (EMS), it is your job as a senior-level executive to ensure that the system is managed in a way that maximizes your company's return on its investment. From the moment your system is installed, its management, maintenance, and efficiency become inseparably linked.

One of the primary objectives of an EMS is to reduce costs through improved operational and energy efficiency. To achieve that objective, you must invest the time and resources necessary to ensure your EMS is performing properly. This best practice guide will share recommendations for the optimization of EMS performance and proven suggestions that extend its overall life and value to your organization. We will address the most common reasons for EMS system failure, and we will make recommendations for the resolution of these issues through a properly executed System Management Program.

System Management Programs provide an effective strategy to ensure EMS value is maximized without creating an extra ordinate drain on resources. At a glance, those strategies include:

- Reconciliation of system changes by store level personnel
- Maintenance of long-term performance
- Protection of the decisions and investments initiated on behalf of your EMS programs

5 COMMON CHALLENGES TO ACHIEVING MAXIMUM ROI

There are a number of challenges that multi-site companies face in maintaining the value of their EMS. Each greatly impacts system performance and bottom-line savings:

1. SYSTEM OVERRIDES: Given that the primary focus of local site managers is to maintain store operations and comfort, overriding the system settings for temperature and lighting controls is often the quick fix to a complaint.

2. LACK OF DOCUMENTED STANDARDS/ENFORCEMENT: Standard configurations may not be well documented or enforced; therefore, the optimal settings, staggered start times or other energy saving program parameters may not be properly configured in the EMS programming.

3. SENSOR LOCATION: Proper sensor locations within the facility can have a huge impact on the performance of EMS routines. Sensors are often found to be in less than optimal locations within facilities that are not performing efficiently.

5 COMMON CHALLENGES TO ACHIEVING MAXIMUM ROI

1. System overrides
2. Lack of documented standards
3. Sensor location
4. Nuisance alarms
5. Improper maintainence

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4. NUISANCE ALARMS: When any of the above or other issues exist, an excessive number of nuisance alarms can occur. It is easy for site managers to become complacent and ignore these nuisance alarms. Failure to actively monitor and prioritize system alarms can result in missed opportunities to take the proper corrective action in a timely fashion, resulting in increased energy costs, unnecessarily reducing asset life, and causing other important alarms to go unmanaged.

5. IMPROPER MAINTAINENCE: Periodic recommissioning of the EMS is not always performed at a reasonable frequency; therefore, proper configuration settings may have been altered. Energy saving control algorithms can become out-of-date and out-of-sync with current operating standards of efficiency, or out-of-sync with actual site conditions. These all lead to a higher cost of operation.

The following best practices address these issues. They should be implemented to maintain facility efficiency, optimize occupant comfort, and preserve the life of costly equipment, all of which boost the return on your EMS investment.

MANAGE USER INTERACTION & PERMISSIONS

A properly commissioned EMS is designed to optimize the balance between human comfort and energy savings, but what happens when human interaction inhibits system capabilities? Consider the daily routine of onsite managers. In addition to their many daily tasks and responsibilities, they are the recipients of any facility related issues or complaints. When a building feels too warm, or too cold, they are the ones who receive a notice or call. Given the pressure to respond, these onsite managers often take it upon themselves to override system settings and adjust temperature controls. To avoid these costly changes from adding up, close management of user permissions and a plan to systematically restore proper settings are essential. Many EMS implementations have no set permission levels at all, allowing ANY user to override configuration settings at any time. Access to these sensitive systems should be limited to designated, trained personnel.

BEST PRACTICE: Site-level management can significantly impact EMS performance. Limit access to authorized personnel only, and ensure that systems are set properly through continued monitoring and management. When manual overrides are identified, take quick corrective action and bring system settings back to standard levels according to business rules. Support the education and training of site-level personnel on proper EMS management. Address comfort concerns and work to identify the root cause of recurring complaints.

PRIORITIZE SYSTEM ALARMS

A key function of an EMS is to monitor energy-consumption and notify users of potential issues as they arise via alarms. These can include simple alarms, such as a dirty filter or occupancy mode change, or more critical alarms, such as a chilled water pump failure. In any given day, a single site in your portfolio could produce 50 to 100 alarms, depending on the amount of equipment being controlled. While system alarms play a critical role in supporting quick identification of potential building and equipment issues, it is not uncommon to see EMS performance degrade as site personnel become less responsive to these alarms.

Similar to the previous concern of unwanted human interaction, the inaction of site-level personnel can also degrade EMS performance. System notification alarms can be so numerous as to become unmanageable,

eventually being considered nothing more than a nuisance to building managers. Excessive alarms may cause building personnel to ignore or simply turn off system alarms, rather than respond to them.

BEST PRACTICE: Smart monitoring and a documented process for alarm triage are essential to managing EMS alarm notifications and ensuring corrective action is taken in a timely fashion. There are varying levels of operational, financial, and efficiency impacts dependent on the severity of the alarm. It is important to develop and maintain a protocol that escalates the most critical alarms and prioritizes less critical alarms that require a different response time.

ESTABLISH EFFECTIVE CONFIGURATION STANDARDS

Configuration settings are useful in minimizing equipment runtime, and they help reduce monthly and even annual peak demand charges. Successful strategies include the optimization of start/stop programs and equipment start-up staging delay settings.

Optimized Start/Stop (OSS) programs are an energy saving sequence that align indoor and outdoor temperature with equipment runtime, to optimize the "shoulder" periods before and after store occupancy schedules. "Shoulder Mode" is an industry term that can be illustrated by an example of not bringing a building down to temperature as soon as employees walk in the door, but moving toward optimum temperature a couple of hours early. If you've determined that your optimum temperature setting is 73 degrees during the summer months, the energy or facility manager could execute a shoulder mode approach by setting the EMS to operate at 75 degrees for an hour or two before opening, then adjust down to 73 degrees in time for store opening. This approach takes careful attention, and correctly maintaining these settings is a critical element in minimizing equipment runtime while maintaining occupant comfort and maximizing energy savings. A properly configured OSS program can reduce annual equipment runtime 12 to 15% compared to a site that does not utilize this strategy.

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By staggering start times by 60 seconds or more, you can avoid simultaneous starts and effectively reduce peak demand costs.

Proper staging of all electric motors greater than one horsepower is another important configuration setting to manage closely. By staggering start times by 60 seconds or more, you can avoid simultaneous starts and effectively reduce peak demand costs. When these settings work in conjunction with optimized start/stop programs you can minimize equipment runtimes while properly balancing comfort and energy efficiency.

An optimized start/stop program and stage configurations are just two examples of the many sequences of operation that must be properly aligned and maintained to avoid degradation of system settings and savings over time. Improper operational sequences can expand to a range of programming issues.

BEST PRACTICE: Establish and document standard configuration settings for system sequences of operation. This should include some level of ongoing system audit or data-based analytical review. With a record of proper configuration standards, it's more likely that individuals won't make efficiency-compromising adjustments over time. Monitoring alarms and data from the EMS helps ensure proper efficiency is maintained across all programming sequences, at all sites, portfolio-wide.

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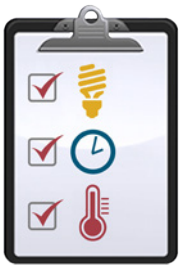
PINPOINT SENSOR LOCATION

Picture a site after an extensive heating, ventilation, and air conditioning (HVAC) renovation. A new HVAC unit should be operating at peak efficiency, but a cursory review of EMS data suggests otherwise, perhaps indicating that the unit is not running at all. This leads to a costly maintenance visit, which only concludes that the HVAC unit is fully functional. This scenario happens all too often at the hands of improper sensor placement. If supply air is blowing directly on the sensor, it registers cold air and causes the HVAC equipment to turn off. This in turn causes a false alarm, an unnecessary truck roll, and an uncomfortable environment for building occupants. Similar instances often occur as renovations take place; sensors are knocked off a wall or repositioned to an improper location, or interference-causing equipment is installed nearby without any thought to relocation of the sensors.

BEST PRACTICE: Review and verify that system sensors are placed in optimal locations, and reflective of actual conditions being controlled. Test and maintain EMS sensor calibrations routinely to ensure the integrity of the sensors is not compromised and that equipment and sequences will perform as expected.

DEVELOP A VARIANCE MANAGEMENT POLICY



From time to time, it is necessary to make changes to standard EMS settings at an individual site. In situations where maintenance testing is scheduled to take place, a special event with extended sale hours is planned, or temporary changes in employee scheduling occurs, in each of these cases it is important to allow temporary overrides to standard system settings.

Often times, these changes are made to the EMS but are not changed back in a timely manner. Worse, they are sometimes not changed back at all. To avoid excessive costs, it is important to ensure that these temporary adjustments are reverted back to standard settings when business returns to usual.

BEST PRACTICE: Implement a Variance Management Process. This should include a formal variance request and approval process—as well as a mechanism for tracking changes made—to ensure that non-standard operation is minimized. Develop a checklist to ensure that EMS settings allow for some level of variability. Hold team members accountable to be sure that EMS settings are returned to their proper, standard configurations.

PERFORM PERIODIC SYSTEM BACKUP

Configuration settings and EMS program files should be backed-up at every site. The consequences of not performing backups are obvious when a failure occurs. These situations can arise when a local uninterruptible power supply (UPS) fails and the battery goes dead, or when a controller fails and previous programs are no longer accessible. This is even more critical for companies that have put off capital expenses and use older equipment, where the failure rate may be higher than it is for companies running newer technology.

BEST PRACTICE: Implement a schedule for periodic backup of the configuration and program files for the EMS at every site.

Backups are critical for companies who've put off capital expenses and use older equipment where the failure rate may be higher than with newer technology.

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RECOMMISSION ENERGY MANAGEMENT SYSTEMS

Improper maintenance and failure to conduct timely recommissioning can cause suboptimal operation and lead to increased maintenance costs and energy usage in comparison with similar sites. A good recommissioning program can be of great value, particularly at those sites where:

- EMS has not been properly maintained
- Users have been able to compromise the EMS settings
- Renovations or the addition of new system technologies have changed the building design

Improper maintenance and failure to conduct timely recommissioning can lead systems to break down, causing maintenance costs to rise and increased energy usage in comparison with similar sites.

Without appropriate system commissions, you may notice that the equipment in your building is running inefficiently or unnecessarily, or that the system is both heating and cooling at the same time. Red flags to watch for include increased energy use, issues with site comfort, and a large discrepancy in the number of service calls and maintenance fees from site-to-site or region-to-region.

Recommissioning services not only correct existing problems, they optimize system operation so the EMS functions as effectively as possible according to your business needs. These efforts are often cost-justified based on energy savings alone. In some cases, you can apply for utility incentives to provide additional financial support. A recommission of your EMS typically includes:

- A complete audit and testing
- Repair and recalibration
- Reprogramming

The Environmental Protection Agency's ENERGY STAR® program recommends that, every three years, systems are confirmed to be properly installed, functionally tested and recalibrated so that they are capable of being maintained and operated.

BEST PRACTICE: Implement a schedule of periodic EMS recommissions. This is critical to preserve the life of your system. Other benefits include improved energy efficiency, a more comfortable environment with fewer occupant complaints, reduced operating costs, and an overall improvement in EMS and equipment performance.

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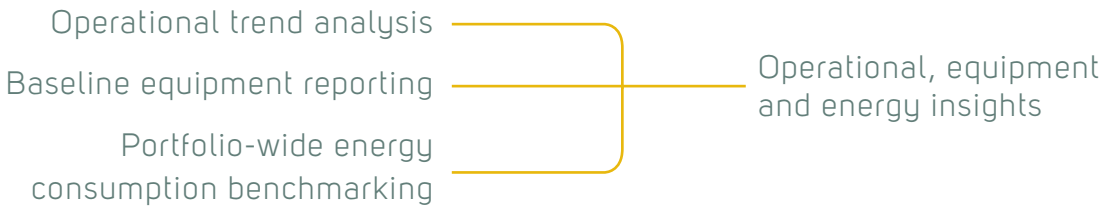
LEVERAGE THE WEALTH OF DATA

The common theme in each of the best practices discussed here is comprehensive data. Your EMS provides a wealth of information, and effective data analysis will provide critical business intelligence.

Data support tremendous operational, equipment, and energy insights and further support:



Establishing standard metrics will help guide your resource management. Trend analysis can reveal sites and equipment that are not performing optimally. By tracking and analyzing data points from your EMS, you can identify the root cause of system alarms. Analyzing energy usage uncovers cost increases over time, but without business rules around sensors, you might have never realized a sensor was indicating a refrigeration unit's set point had been manually changed to be too low.

System monitoring establishes a baseline of ideal EMS productivity, which can be easily checked over time. Data points can then be compared with internal and external benchmarks, contrasted with peer sites, tested against previous information, and used to promote ideal operations sequences.

BEST PRACTICE: Leverage your data. Make sure you have processes in place that allow you to correlate good maintenance with energy use. This combined intelligence will help you identify potential risks before they cause financial and operational repercussions. From site comfort to service calls, every data point tells a story. When you use that data to control EMS efficiency, you improve system performance, extend the life of your equipment, and maximize your ROI.

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CONCLUSION: OPTIMIZE EMS THROUGH SYSTEM MONITORING & MANAGEMENT PROGRAMS

The best practices addressed above constitute a comprehensive and productive system monitoring program capable of maximizing your EMS ROI. While compliance with these best practice standards can take a significant amount of work and resources, active management will pay for itself. Let's take a moment to look at two other industry approaches to managing EMS: preventive maintenance (PM) vs run-to-failure.

At opposite ends of the spectrum, you could choose to adopt either a complete PM program or subscribe to a run-to-failure philosophy. Over the past two decades, PM programs have fallen out of favor due to resource constraints. Many companies have reduced maintenance labor due to budget cuts and instead implemented a run-to-failure philosophy. In the short term, running-to-failure can reduce maintenance costs. Often, it also leads to higher energy costs. Over the long term, equipment failures become more frequent. This, combined with higher energy costs, results in a higher total cost of operation.

In practice, the pendulum shouldn't swing too far to either side.

The best practices we have presented to maximize EMS ROI offer a practical approach to system monitoring and management success. These suggestions constitute a balanced approach—based on the proactive monitoring of alerts and data—which allows you to respond to equipment issues before they escalate into larger comfort issues, expensive maintenance calls, or operational concerns. Proper maintenance can be scheduled based on the needs of the facility, and continually improved on over time by allowing the data to guide effective decision-making.

THE BEST OF THE BEST: Implement a cost-effective system-monitoring program inclusive of these best practices. The result will be an improved return on your original EMS investment and an extended lifecycle for its connected physical assets.

LEARN MORE:

Continuous Monitoring Datasheet

Facility Optimization Infographic

Facility Optimization Video

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SUMMARY OF BEST PRACTICES TO MAXIMIZE ROI OF ENERGY MANAGEMENT SYSTEMS

- ☐ Manage user interaction & permissions
- ☐ Prioritize system alarms
- ☐ Establish effective configuration standards
- ☐ Pinpoint sensor location
- ☐ Develop a variance management policy
- ☐ Perform periodic system backup
- ☐ Recommission energy management systems
- ☐ Leverage the wealth of data
- ☐ Optimize EMS through system monitoring & management programs

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ABOUT ECOVA

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