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Key Considerations for Selecting an Energy Management System

How the right partner can deliver a fast ROI through significant annual energy and equipment maintenance savings.

White Paper

Overview

Retailers who have not automated their facility energy operations often rely on time-constrained store and regional managers to monitor energy usage. This typically translates into inconsistent compliance with corporate program standards.

On the other hand, those retailers who have made a significant investment in an Energy Management System (EMS), in the form of pilot programs or regional rollouts, often find that the expected savings never materialize, and/or the cost of implementing and maintaining the system over time substantially reduces the ROI.

These constraints have created a serious dilemma for retailers. While an EMS holds the promise of delivering savings and even generating revenue (imagine the boost to your profit margin by recouping 30% of your energy spend), the prospect of evaluating vendors, assigning staff to manage the roll out, and perceived risk for return on investment makes the decision seem quite challenging.

To help retailers improve their chance of long-term success in implementing an EMS, this white paper provides a list of the key considerations for system selection and evaluation.

EMS Selection Criteria

An EMS solution should equip energy and facility managers with the ability to rapidly and effectively identify and resolve true equipment problems or site issues across an entire chain of geographically dispersed sites. At Siemens Retail & Commercial Systems, we believe that energy management is a process, not a one-time project. Moreover, best results are realized with technology that drives the focus toward the day-to-day process of energy and maintenance cost reduction, rather than controls for the sake of controls. The key to success with your EMS is finding a partner who shares the same philosophical approach, offers the technology to drive such change, and helps provide proven continual improvement year-over-year.

A white paper issued by: Siemens

To successfully deliver significant cost savings from the onset, and to sustain and increase those savings over time, the Energy Management platform must have a proven track record of meeting the following criteria:

1. ENTERPRISE PORTAL CAPABILITIES

Data is key to maximize visibility and control. However, organizations with 100 sites or more will understandably have large data streams. Analytics are required to create actionable information. So a key question for your organization to consider is: Does the EMS automatically determine the greatest opportunities? The answer should be yes. And, Siemens recommends you also consider how this is achieved.

How will you gain a global understanding or prioritized view of the opportunities that will favorably impact energy consumption or poor equipment performance? It is not a cost-effective solution to have your staff sifting through alert/alarm bombardment messages or drilling down into each site to generate a prioritized list.

Any application of analytics requires a data store of some sort. The data store must have the capacity to hold the data generated for a considerable period of time. Since year-over-year comparisons help to normalize data for seasonal variation, it's usually best if the data store can hold at least a couple of years' worth of data.

This stored data is the lifeblood of any analytics system and must be scrupulously maintained. It must be reliably available: data will be pouring in every minute of every day and any outage means data loss. Acceptable downtimes (depending on system architecture) should be in the range of only a few minutes per year. The data store must be performant. There is no point in saving data if extracting it from the system isn't fast enough for timely analytics. The data store must be backed up and must have a failover option.

KEY SYSTEM FEATURES MUST INCLUDE:

- A mechanism for automatically identifying, processing and prioritizing exceptions related to equipment and site energy performance
- A configurable framework for automatically taking specific actions in rectifying errant conditions
- Encourages proactive management via intelligent exceptions scoring rather than reactive response to store complaints or simple alarm bombardment
- Site rankings according to the relative duration and severity of the potential exceptions identified at each site
- Dashboard displays of key metrics across all sites (energy and exception type)
- The manual or automatic ability to remotely reset/restart HVACs and to issue remote timed shutdowns
- Detection and reporting of remote overrides or attempts by on-site personnel to defeat the EMS
- Direct, real-time access to the site available to users (internal and authorized 3rd party agents), without requiring a separate VPN connection be established for each user in order to protect network resources
- Ability to send multi-site changes to temperature set points or temporary schedule changes
- A full audit trail of every user change or update, automatically available within the system
- Detailed, context-sensitive online help
- Integration capabilities to feed key energy and post-processed site analytics into upstream or downstream systems, e.g. ticket management.

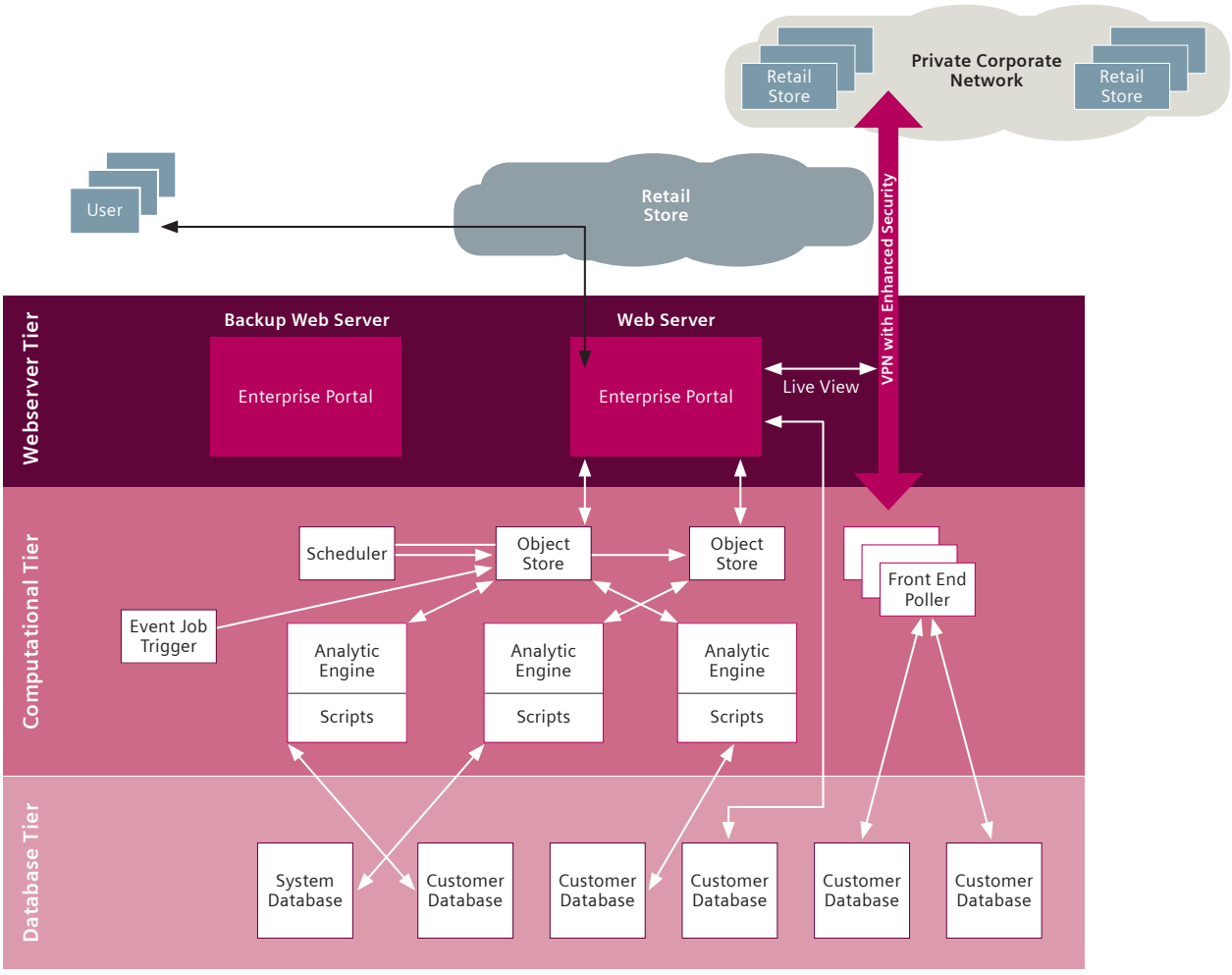
2. ARCHITECTURE

Over the past ten years there has been a significant shift away from on-premise servers to 'software as a service' via cloud computing for mission critical business applications. Energy management software is no different. Retailers should look for a cloud-hosted solution that offers analytics and operational dashboards that will enable enterprise-level control without the IT and administrative costs of on-premise computing. An enterprise management approach uses open architecture to enable real-time visibility and control across all locations. In addition to performance dashboards viewed through an Enterprise Portal, an EMS platform should include Application Programming Interfaces (API's) to support machine-to-machine integration to existing information systems, such as work order management applications.

Key EMS Architecture Requirements:

- Enterprise-class website with three-years data storage of all site telemetry (15 minute time-stamped data)
- Automatic polling connectivity to all sites as well as on-demand live data views
- Robust IT security features such as two-factor authentication and multiple data encryption methods
- Cloud hosting services provided by SAS-70 Type II accredited data center
- Efficient communications to minimize impact to network bandwidth
- Multiple communications options for flexibility, e.g., cellular modem, DSL and VPN over corporate network

Modern Enterprise EMS platforms should feature a tiered architecture to maximize security, scalability and data integrity.



3. EXTENSIBILITY

To measure it, you first need to monitor it. And to improve metrics, the analytics must be highly visible for all stakeholders: Above-site visibility for management, actionable, regional level views for department heads, and drill-down capabilities for field technicians.

The more participants you have using your EMS the faster adjustments can be made to the energy consuming equipment.

For example, a contractor can perform repairs on a rooftop unit, and before climbing down, can log into the EMS and look at data streaming in real time to determine if the problem has been correctly fixed. Similarly, an HVAC dispatch service provider can use the EMS to remotely validate that repairs were completed prior to issuing payment.

To achieve this level of extensibility, an EMS must demonstrate proven capabilities to monitor the following devices:

- Zone temperature
- Supply temperature
- Outdoor air temperature
- Indoor & outdoor humidity
- Outdoor light levels
- Outdoor signage
- Revenue-grade energy meter
- Carbon dioxide levels
- HVAC supply temperatures with stage and run-time tracking
- Lighting schedules
- Refrigeration temperature and defrost cycles
- Hot water temperature

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4. SYSTEM CONTROLLER

The system controller should utilize the latest hardware and software technologies and open architecture standards to ensure future upgrade paths and scalability.

Other considerations include:

- Are there options for a standard wall mount in the electrical room or on a support column on the floor? Will the thermostat control be mounted in the space, RTU or manager's office?
- Does an independent energy meter monitor demand (kW) and consumption (kWh)?
- Will the controller store telemetry data for all RTU and sensor data for minimum of 3-days to prevent data losses in connectivity disruptions?
- Does the controller utilize the latest known schedule and set points in the event of communication failure?
- Will the lighting controls fail to the "On" position so the store will not go dark due to a failure of the EMS?
- Does the lighting control incorporate operating schedules with photocell override (e.g. activate outdoor signage during heavily overcast day to indicate store is open for business)?
- Can the controller software be upgraded remotely to allow for system enhancements without necessitating a site visit?
- Does the controller support advanced energy-saving capabilities such as Demand Control Ventilation, Global Enthalpy control, Psychometrics and Daylight Harvesting?

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5. IMPLEMENTATION

Comprehensive implementation services will alleviate pressure on your staff, or the need to increase headcount. The vendor you select should handle all aspects of the implementation.

You may also want to consider a pilot program and review the results each month. Require that your vendor conduct an in-depth Measurement and Verification (M&V) process with the pilot locations. This will capture an accurate representation of how much money your company could save by implementing the EMS solution across your entire chain.

- Installation must include a utility grade meter
- Installation must include both on-site commissioning plus above-site verification of equipment performance
- Detailed commissioning documents must be provided. Examples include:
  - HVAC RTU layout
  - Lighting circuits
  - Results of energy meter validation
  - Results of Hot/cold HVAC testing
  - Model and serial number of all HVAC units

6. DEMAND RESPONSE

The EMS provider should facilitate safe and profitable participation in Smart Grid programs, such as Demand Response (DR). Their expertise should be relied on to maximize your DR revenues while reducing risk.

Key questions to ask include:

- Is the EMS provider an approved Demand Response aggregator in all major utility service areas offering significant programs?
- Are DR measures completely automated with 5-minute telemetry?
- Is the DR system certified compatible with all OpenADR standards?
- Are site conditions continually monitored and strategies adjusted to account for changing conditions?
- Do sites automatically 'opt out' of events if equipment or site conditions threaten to impact occupant comfort or the customer experience?
- Does the provider 'pool' all sites into a single DR resource to reduce risk and maximize payments?

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7. CLIENT SERVICES

It is critical that your organization defines and executes a plan that adequately supports the deployed EMS. When properly implemented, an EMS support structure not only maintains the initial savings garnered, but will also yield incremental energy savings annually. Look for a vendor who offers flexible support options that meet your business model, whether you have a dedicated in-house staff or a field of third-party vendors.

The vendor should provide, free of charge, monthly meetings that include vendor EMS professional services personnel and your energy management and facility management department. The purpose of the meeting will be to review Key Performance Indicators (KPIs) related to EMS and site performance, with the goal of improving the savings generated by the system.

Additional services should include:

- Green branding support services such as assistance with in-store signage, case studies, industry award nominations, Carbon Disclosure Project, and public relations must be provided, free of charge
- Integrated rebate management services with a revenue sharing agreement to maximize the benefit of energy efficiency and load management financial incentives
- Regular customer satisfaction surveys should be conducted
- Technical support for end users as well as third party service providers
- Training should be provided to customer's service contractors on the use of the EMS for remote diagnostic support of HVAC and lighting services

Conclusion

In addition to the specific EMS criteria listed above, perhaps the most important factor to consider is the reputation, history and financial stability of the technology and services provider, including its ability to provide references from multiple satisfied long-term clients. An integrated EMS, consisting of hardware, software and professional services, serves as the foundation of significant energy and equipment maintenance savings across your enterprise. When properly supported, the EMS effectively pays for itself in a relatively short time frame. Energy reductions of an average of 15 percent and HVAC/lighting maintenance savings exceeding 15 percent have been proven in thousands of installations. With proactive management and the right vendor partner, these savings are sustained and actually increase over time.

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