

EEMS FUNCTIONAL REQUIREMENTS

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Objectives for EEMS deployment

1. Streamline Resource Consumption and Cost Data

Entry. rather than disparate spreadsheets, allowing departments and facilities users to enter data, either manually or electronically, once and have that data viewable by employees in multiple departments

2. Establish Reliable Bill Validation and Auditing

Avoid manual methods that are time-consuming, do not automatically alert the agencies to anomalies and potential billing errors, and are susceptible to human error. Need automatic tools to validate and audit utility and commodity bills in a more efficient and effective manner

3. Establish Tracking and Reporting Capabilities

database application for tracking consumption and costs related to electricity, natural gas, water, steam, diesel fuel and gasoline by meter, account, facility, and agency . Normalized reporting

4. Standardize Greenhouse Gas Emissions Calculations.

Single reliable carbon calculator

5. Integrate Energy Management with Financial Systems.

pass bill data to financial systems and eliminate the need to manually enter data directly into the financial systems



EEMS Deployment Models

SaaS Hosted

Service Type	SaaS Hosted Single-tenant hosting – subscription license model Deployment
Non recurring fee	\$75-\$100k; 5-years of historical data upload; 100 facilities; up to 10 participating business units, with designated personnel from each business unit trained in data input and management
Annual subscription costs	~\$100k include maintenance, support, computing infrastructure, software infrastructure, new product releases
Contract length	3, 5, 7 years
Additional training	\$1600/per day for 1 consultant

SaaS Cloud.

Service Type	SaaS Cloud Multi-tenant hosting – subscription license model Deployment
Non recurring fee	\$75-\$100k; 5-years of historical data upload; 100 facilities; up to 10 participating business units, with designated personnel from each business unit trained in data input and management
Annual subscription costs	~\$75k include maintenance, support, computing infrastructure, software infrastructure, new product releases
Contract length	3, 5, 7 years
Additional training	\$1600/per day for 1 consultant

On Premise

Service Type	On-premise Client Deployment with Maintenance (client-side deployment – perpetual license model)
Non recurring fee	\$350-\$375k; 5-years of historical data upload; 100 facilities; up to 10 participating business units, with designated personnel from each business unit trained in data input and management
Annual subscription costs	~\$60k include maintenance, support, BUT NOT computing infrastructure and software new releases
Contract length	3, 5, 7 years
Additional training	\$1600/per day for 1 consultant



Recommendation for Deployment

Generally, the cloud-based delivery model provides several key advantages including faster deployment, scalability for a global enterprise, flexibility no IT hardware/software support on client's side, and configurability for organizations of all sizes and immediate access to the latest releases with options for selecting or de-selecting features. This is the recommended model for deployment at the City of Boston.



Setup & Design & Support Requirements

The EEMS solution should have the following features from design, setup and support perspectives:

Setup & Design:

Web based solution, requiring no plug-ins or middleware on the users' desktop/laptop. Commercially available software and not costly customized solution. System administration to be performed in-house and not require vendor services. Vendor responsible for setting up the solution so that it is ready for use; soft/hardware, applications/databases, input meter/account info, buildings metadata, users/passwords

Data communication between facilities and central software application to minimize communication costs, transmit data through firewalls and contain local data storage capabilities, utility readings should be capable of being displayed in real-time

Scalable to include hundreds of thousands of monitoring points within hundreds of buildings all supported by single instance of the database and application. Process data from various building automation and sub-metering systems for analysis and reporting



Setup & Design & Support Requirements

Setup & Design: Continue..

Flexible and customizable graphical user interface where departments and facilities may define and build their own screens, view real time data, KPIs, specific reports, etc

Comprehensive library of standards “EPA, ENERGY STAR, CBECS,..” and custom resource specific reports types delivered without requiring system administrators to setup and define reports. All reports should be easily exported to MS Excel/Word/Access

Support accessing and pushing data to and from external sources such as weather from weather content service; real-time prices and market settlement data from local market operator; accounting data to Accounts Payable system; and electronic bill data from utility

Support multiple data types for analysis and reporting purposes such as instance energy, temperature, occupancy, financial, and other departments and facilities related data



Setup & Design & Support Requirements

Software Licensing:

Cloud based software license (SaaS) with unlimited usage (enterprise license) to manage energy use, cost, and risk, full web based access around the clock

License should not limit the total number of users or concurrent number of users. The users may have an administrative role where they can make entries, modifications and create conservation projects or can have view only access and create various reports to satisfy various business needs

Solution should include all of the required server(s) with backup system, media, and tape backup software



Setup & Design & Support Requirements

Software Warranty & Support:

It is recommended that a warranty period of at least one year from the acceptance date be pursued. During the warranty period, all of the services listed, but not limited to the following, shall be provided to the City of Boston at no additional charge:

Bug patches and fixes within 12 months of release

Updates and upgrades within 12 months of release

Firmware within 12 months of release

Technical support to include telephone helpdesk/online help service with guaranteed response time

Remote diagnostic support

On-site support for error resolution events



Setup & Design & Support Requirements

User Training:

The vendor to be responsible for providing a minimum of one on-site training session for employees who will be initial users of the energy management system. The vendor should also be responsible for providing the appropriate solution documentation and user training modules. The vendor should also be responsible for providing future on-site training classes, as requested by the departments and facilities.

Data Hosting:

SaaS hosted or cloud solutions involve data hosting by the vendor, the vendor will be responsible for the hosting of City of Boston data in a secure and reliable data center. City of Boston should retain ownership of their respective data provided or inputted into the proposed system and retain the rights to remove their data from the system at any time. It is anticipated that data can be exported out of the system if the city decides to maintain a concurrent record, .csv or .xls.



Functional Resource & Operational Requirements

Resource & Utility Usage:

System must track municipal resource “Electricity, Natural Gas, Steam, Water, Fuel” periodic (monthly) consumption from electronic feed billing as available from utilities data once posted on the web. Electronic import of bills direct from utility providers, download and store bills from utility providers electronically in an online database for reporting and analysis through browser-based user interface.

Historical use & energy procurement:

Vendor to be responsible for loading a minimum of two years of utility and commodity consumption and cost data, as provided by the City of Boston departments and facilities, into the EEMS.

EEMS to allow department users to define and analyze flexible profile scenarios to optimize energy pricing and risks in energy procurement. EEMS should allow departments and facilities to identify and save alternative utility metering groups by building type, size, geographic location and so forth for analysis, reporting, and procurement purposes.



Functional Resource & Operational Requirements

Historical use & energy procurement: Continue..

EEMS should generate the required data to produce procurement RFP's for energy efficiency and sustainability projects. Data may include forecasted energy profile and volume data for actual and typical day types, throughout selected accounts and account categories.

EEMS should have a capability to provide alternative rate plan comparisons and conduct sensitivity analyses around volume forecast variances. Departments and facilities should be able to model alternative rate and pricing plan proposals for decision making purposes. City decision makers should be able to compare energy use forecast sensitivities against the proposed rate plan to establish the optimal risk proposal.



Functional Resource & Operational Requirements

Resource benchmarking:

Allow for comparison of facilities for benchmarking by size, activity, space occupancy, and weather variances. Benchmarking should include industry standards or best practices Key Performance Indicators (KPIs)* as either built into the software or easily defined by the users. Benchmarking with respect to existing national databases such as EPA ENERGY STAR via built-in interface should also be either accessible.

Demand Management:

EEMS should provide demand response programs participation by allowing the City of Boston departments to reduce energy use in response to short notice pricing incentives. Demand response should cover multiple facilities and include capability of balancing load reductions throughout facilities. EEMS should provide monthly peak demand monitoring



Functional Resource & Operational Requirements

Notification Capabilities:

It is expected that EEMS should provide generation, prioritization, notification, and analysis of alarm events. Alarm events should be stored in the EEMS to allow trend analysis for maintenance purposes.

Diagnostics Capabilities:

One EEMS capability that started to gain momentum is its ability to provide facility equipment monitoring, indentifying anomalies, and assisting in diagnostics to resolve the situation. Analysis may include quantifying the correlation of energy use to operational variables to improve productivity of maintenance management personnel. Historical data should be leveraged for predictive maintenance and fault detection purposes.



Functional Resource & Operational Requirements

Units Conversion:

EEMS should have capability to store multiple units of measure for the same commodity and automatically execute unit conversion for reporting in common units. Also, EEMS should manage several currency units in a single instance of the database and allow automatic conversion into a single currency unit for reporting purposes.

GHG Emissions:

EEMS should automatically calculate and report processes for greenhouse gas emissions “scope 1 & 2” and pollution reporting that is tightly linked to measurement and verification features to support carbon finance. Manual data entry for direct emissions (scope 1 items) should be a capability as such also for indirect emissions (scope 2). The solution should also comply with carbon protocols suitable for credit sale. The vendor should demonstrate ability to create new sustainable fund sources for local government energy efficiency projects through carbon finance.



Functional Financial Requirements

Utility Bill Analysis, Validations and Audits:

Capable to provide automatic bill auditing to identify and report use and pricing errors in monthly utility bills. This includes all resources such as electricity, natural gas, water, district steam etc

Able to recalculate and verify utility bills for complex rates, including real-time pricing, time-of-use, demand ratchets, reactive power, power factor penalties, and unbundled pricing structures for commodity, transmission, and distribution charges.

Perform reliability checks on incoming bills from utility providers. Checks should include evaluating current month energy use, demand, price, and cost to prior months and years. EEMS should check for billing cycle continuity to detect possible billing errors.

Capable of automating import of interval data from various data sources including advanced metering infrastructure (AMI) interfaces, meter data databases, building control systems, IP meters, meter serial interfaces, meter pulse options, and batch data import (e.g. csv files).



Functional Financial Requirements

Utility Bill Analysis, Validations and Audits:

Include interval data validation to detect gaps and/or spikes. EEMS should allow option to automatically fill and/or correct data

Use various methods to calculate bills for utilities produced onsite and purchased. Bill calculation methods may include:

- Use multi-component rate structures to metered usage
- Apply rates to estimated usage
- Determine usage estimates based on square footage and usage indices
- Split incoming utility bills between multiple recipients

Functional Financial Requirements

Resource & Cost Allocation:

Allocate quantities and costs to different departments sharing a facility. Departments may elect to allocate monthly utility bills through a percentage/fixed fee allocation method and calculation of cost based on metered usage and internal transfer prices. EEMS will allocate energy use (kWh, therms,..) to different departments by meter or facility

Budget Tracking & Normalization:

Ability to monitor and report actual energy use and cost versus baselines and normalize information for weather and other energy drivers. EEMS should store actual baseline usage and cost values for analysis and reporting purposes.

Support energy budget development and energy expenditures against monthly budgets tracking. Departments or facilities may get notified of budget variances. Monthly budget data will be stored in EEMS for energy use, cost and reporting purposes.



Functional Financial Requirements

Budget Tracking & Normalization: Continue..

EEMS system is expected to have capability to model and apply rates with the following:

- Separate rates for commodity, transmission, and distribution
- Unlimited channels per meter
- Maintain rate change and adjustment histories
- Index to real-time price feeds from price exchanges
- Load factor, power factor, and price blocks
- Demand ratchets and demand charges
- Multiple calendar definitions such as different definitions of winter and summer, break periods that can be defined once and referenced various times
- Multiple Time of Use (TOU) definitions that can be defined once and referenced various times
- Referenced charges such as fuel adjustments or surcharges that can be defined once and referenced various times

Integrate into other Financial Systems:

To pass utility bill data to their financial systems and eliminate the need to manually enter data directly into the financial systems



Functional Financial Requirements

Emissions & Energy Reduction Project Workflow:

Robust project tracking tool includes creation of an energy/emission reduction project, tools to support decision making process for project proposal selection and sequencing, scope, resources, budget, timelines, automatic generated alerts and notifications and success criteria. Also, how to track status of individual projects and view the overall status of the energy/emission management program with multiple projects .

Project Cost-Benefit Analysis:

The EEMS solution should plot the energy and sustainability reduction plans, and then develop measured strategies to reduce and abate both energy and sustainability costs and impacts. Based on the user-forecasted savings and costs information as well as incentives information, the system should calculate financial metrics such as Payback Period, Net Present Value (NPV) and Internal Rate of Return (IRR). At the same time, the system should quantify the environmental impact of the projects based on the reduction in energy consumptions. Furthermore, using a scenario modeling tool, a user should have the option to conduct what-if and Life Cycle Cost Analysis (LCCA) on how different combinations of projects affect financial projections.



Next Steps

- EEMS vendors presentations
- ENERGY FORUM