Metering & Energy Management Information Systems (EMIS)

For: Boston Green Tourism Organization
March 21, 1013

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Agenda

- Why metering?
- Metering architecture
- Estimated costs to meter
- Case study
- Energy management information systems (EMIS)
- “Value” of metering
Why Metering?

- Improve efficiency and reduce energy-related costs, due to various mechanical (Air handlers, Boilers, Chillers, Lighting panels, etc.) and electrical equipment not operating at design performance
- Prevent potential failures/downtime of equipment
- Improve response to power-related problems and proactively assess potential issues
- Identify opportunities to reduce peak demand and power factor utility penalties
- Enable participation in load curtailment programs (e.g. Demand Response)
- Reveal opportunities for property improvement projects and verify ECM project(s) ROI’s
- Allocate all energy (*WAGES) costs to separate tenants and/or departments
- Leverage existing infrastructure capacity and avoid over-building

*WAGES = Water, Air, Gas, Electric, & Steam
Proposed Building Energy Reporting & Disclosure Ordinance FACT SHEET

Background

In 2010, Mayor Thomas M. Menino’s Climate Action Leadership Committee recommended that the City establish an energy reporting and disclosure requirement for building buildings by 2012. The Leadership Committee further recommended that the reporting be done through Energy Star Portfolio Manager and that the City work with utilities to try to enable automatic transfer of energy data. The establishment of this requirement would “provide information to owners, residents, and prospective buyers and tenants, and, through education and the operations of the market, create incentives to participate in energy efficiency programs.” Energy efficiency in existing buildings is the single most important component of the City’s plan to reduce greenhouse gas emissions 25 percent by 2020. New York, Philadelphia, Seattle, San Francisco, Minneapolis and other cities have enacted energy reporting and disclosure requirements in their jurisdictions.

Proposed Ordinance

Mayor Menino has submitted a proposed energy reporting and disclosure ordinance to the City Council. The basic components of the proposed ordinance are:

Leading by example, the City would annually disclose energy and water use in all its facilities beginning in 2013 for the 2012 calendar year.

All large and medium buildings or groups of buildings would be required to report annual energy use, water use, and greenhouse gas emissions through Energy Star Portfolio Manager or an equivalent mechanism as approved by the Air Pollution Control Commission.

The requirement would first apply to non-residential buildings 50,000 square feet and up in 2014 for the 2013 calendar year, and then, in turn, to residential buildings 50,000 square feet and up (2015), non-residential buildings 25,000 square feet and up (2016), and residential buildings 25,000 square feet and up (2017).

The City would make energy and water use per square foot, Energy Star ratings, greenhouse gas emissions, and other identifying and contextual information for individual buildings available on the Internet.

Buildings with Energy Star ratings below the 75th percentile and not meeting other exemption criteria would be required to conduct energy audits or other actions every 5 years to identify opportunities for energy efficiency investment. (Energy Star rates buildings from 1 to 100 using comparisons based on type of building, level of use, and other characteristics.) The City would develop the additional exemption criteria, for example, for buildings that do not qualify for any Energy Star rating or that show continuous improvement. Building owners would not be required to act on the audit.

Tenants would be required to provide energy and water use data to building owners.

Failure to comply with reporting requirements could lead to fines for owners or tenants.

The development of regulations and implementation of the ordinance would be overseen by the Air Pollution Control Commission.
Example Metering Architecture
Estimated Metering Project Costs (5) WAGES Meters

- **Software = $10k – 15k (year 1 cost), $1k annual recurring**
  - Energy Operation Start-up, Configuration, and Commissioning (One Time Cost)
  - Energy Operation Service Fee for 1 Year(s) for Support of 50 points for 1 Sites, no more than 5 buildings (First year, and every year after)

- **Hardware = $5k – 10k**
  - 12 Discrete Inputs for Pulse Counting, Ethernet Connectivity, installed in a TYPE 12 Enclosure (16"H x 14"W x 8"D)
  - HDM, 120/208/240V, 3Ph, 1 Meter Box, 1 meter installed – 6200
  - Plus or minus 1 % ACC. 3000 :5 Amp split core doughnut style CT with 6" DIA. / 28.27Sq." circular window and wire leads for field connection (600V Class)

- **Installation/Commissioning/Engineering = $5k – 10K**
  - Onsite Startup/Commissioning work per Engineering Services Standard Scope of Work
  - Documentation package that includes preliminary/as-built system drawing, as required, and project files

*Total Estimated Cost Per Point = $3.500K – 5.0K*
Case Study – Hilton Opera, Hanoi Vietnam

The “Pains”
- Rate optimization
- Load Shifting
- Energy Trending Analysis

The Solution
- WAGES Monitoring
- EMIS Software Dashboards
Case Study Cont: Property Department Consumption

Monthly Average for Last Month

- Bakery: 2% (3,115 kWh)
- Ballroom: 3% (4,754 kWh)
- Fitness Center: 3% (5,731 kWh)
- Cold Storage: 4% (8,213 kWh)
- Swimming Pool: 4% (8,298 kWh)
- Lobby: 6% (10,239 kWh)
- Kitchen Fan: 8% (14,625 kWh)
- Restaurant: 10% (16,711 kWh)
- Boiler: 15% (26,886 kWh)
- Laundry: 16% (27,391 kWh)
- Room Total: 30% (53,104 kWh)

Monthly Average for Last Year

- Bakery: 2% (3,632 kWh)
- Ballroom: 3% (4,827 kWh)
- Fitness Center: 3% (5,309 kWh)
- Swimming Pool: 3% (5,315 kWh)
- Cold Storage: 4% (5,911 kWh)
- Lobby: 6% (8,380 kWh)
- Kitchen Fan: 8% (13,368 kWh)
- Restaurant: 11% (16,105 kWh)
- Laundry: 13% (22,110 kWh)
- Room Total: 28% (46,061 kWh)
- Boiler: 18% (29,841 kWh)

Tip:

Compare Last Month's Average to Last Year's Monthly Average.
Case Study Cont:

The “Pains”

- Rate optimization
- Load Shifting
- Energy Trending Analysis

The Results!

Based on the analysis, the estimated energy savings are summarized below.

<table>
<thead>
<tr>
<th>Key parameter</th>
<th>Present condition</th>
<th>Recommendations</th>
<th>Estimated savings per month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate optimization</td>
<td>Average cost: $0.083/kWh</td>
<td>Set up peak demand point to manage power consumption each month.</td>
<td>High potential saving</td>
</tr>
<tr>
<td>Load shifting</td>
<td>167,968 kWh On-peak energy consumption</td>
<td>Reduce on-peak energy consumption by shifting loads during peak periods.</td>
<td>$2,923(*)</td>
</tr>
<tr>
<td>Energy trending analysis</td>
<td>-</td>
<td>Manage power consumption</td>
<td>$18,971</td>
</tr>
<tr>
<td>Monthly potential savings</td>
<td>-</td>
<td>Improve energy management</td>
<td>$21,894</td>
</tr>
</tbody>
</table>

(*) Assume 30% on-peak load to be shifted to mid-peak
### Green Hotels - Regional Sustainability Report

<table>
<thead>
<tr>
<th>Category</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Usage Reduction</td>
<td>Energy saved could be powered</td>
</tr>
<tr>
<td></td>
<td>![Lightbulb] 3.75% versus last year</td>
</tr>
<tr>
<td>Amount of Carbon Reduced</td>
<td>Carbon reduced equals to plant</td>
</tr>
<tr>
<td></td>
<td>![Tree] 4.50% versus last year</td>
</tr>
<tr>
<td>Amount of Water Saved</td>
<td>Water saved equals to fill</td>
</tr>
<tr>
<td></td>
<td>![Water Droplet] 4.01% versus last year</td>
</tr>
<tr>
<td>Amount of Waste Reduced</td>
<td>Carbon reduced equals to cars-off the road</td>
</tr>
<tr>
<td></td>
<td>![Trash Can] 3.83% versus last year</td>
</tr>
<tr>
<td></td>
<td>![Car] 666 No. of homes</td>
</tr>
<tr>
<td></td>
<td>![Tree] 12,484 No. of Trees</td>
</tr>
<tr>
<td></td>
<td>![Swimming Pool] 2.5 Olympic size swimming pools</td>
</tr>
<tr>
<td></td>
<td>![Car] 372 No. of Cars</td>
</tr>
</tbody>
</table>
Energy Management Information System Software

Make the most of your energy™

Jeffrey Long | Professional Services | Sales Engineer
Why Implement an Enterprise Metering Solution?

Energy Operation
Display, report on and analyze the complete portfolio of your energy consumption across your enterprise.

- Find anomalies to determine inefficiencies, make changes and lower consumption.
- Measure and detect inefficient equipment or process, ..... replace to lower consumption.
- Lower energy consumption through energy awareness using easily accessed energy KPI’s; start internal energy savings competition.
- Benchmark sites and share best practices to further lower consumption.
End Use Analysis

Identify when, where and how your energy is used. Detailed analysis and views can be done by equipment, location, floor, processes and more.
Dynamic Display

The university has used enough city water this year to fill 7.6 Olympic pools.

- **Energy Reduction over Last Year Equivalent**: 117 cars removed from the road for a year.
- **University Savings over Last Year**: 865,895 kWh.
- **University Cost Savings over Last Year**: $77,931 (assuming rate of $0.09/kWh).
- **Energy Equivalent of Carbon Emission**: 40,069 metric tons CO2e this year.

Provide additional context for the everyday user to better understand their individual impact. Let occupants understand their individual contribution and impact.
Budgeting

Translate your energy consumption and usage patterns into a monetary amount.
Integrate data from disparate systems for an enterprise wide view of your performance. Normalize data for accurate comparisons and easily report on a global scale.
Report on ALL of your commodities at once

Automatically collect and report on electricity, water, gas, steam, compressed air, waste or any other variable applicable to your business.
Benchmarking energy data allows customers to monitor progress towards their energy goals. Benchmarking sites allows companies to identify poor performers in their portfolio. Normalized data presents a more accurate picture of consumption.
Aggregate data from multiple systems
Playlist

Create a playlist that automatically scrolls through important information for employees, occupants or visitors.
Emissions Reporting

Aggregate and report on your carbon foot print across the entire enterprise. Display Energy consumption data using emissions factors from power grid, site generator, zero emissions sources for a true picture of the environmental impact and progress towards “green” goals.
Alarming

Alert you when your usage diverges from a expected behavior. Alert in deviations from planned or modeled behavior. Proactively manage your operating processes by prompting actions to be taken to minimize impact on consumption and other charges. Related events can be entered and tracked for follow-up.
EMIS “Value” Proposition

- Enhanced public image and social responsibility through communication of energy “Key” Performance Indicators (KPI’s)
  - Companies requesting this information for group events
- Provides visibility to general public and building occupants to enable them to become part of the solution
- Helps provide compliance with energy regulations such as carbon emission reporting
- Reduced greenhouse gas emissions
  - Helps to meet corporate Sustainability goals
- Enables the reduction of energy costs, and helps improve the hotels Gross Operating Profit
- Identify and eliminate inefficiencies = saving money and reducing energy demand
Questions / Comments?

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