Enterprise Energy Management System Installation Case Study at Food Process Plant

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1. Introduction

Energy Information Systems (EIS) is a combination of software, data acquisition hardware, and communication systems to collect, analyze and display building information to aid commercial building energy managers, facility managers, financial managers and electric utilities in reducing energy use and costs in buildings. This technology helps perform key energy management functions such as organizing energy use data, identifying energy consumption anomalies, managing energy costs, and automating demand response strategies. During recent years numerous developers and vendors of EIS have been deploying these products in a highly competitive market. EIS offer various software applications and services for a variety of purposes. Costs for such system vary greatly depending on the system's capabilities and how they are marketed.

In spring 2004, Del Monte Foods received a funding from State Technologies Advancement Collaborative (STAC) to install EIS at one of their food process plants. Del Monte requested Lawrence Berkeley National Laboratory to evaluate the EIS vendors. LBNL has been conducting survey and research on EIS.

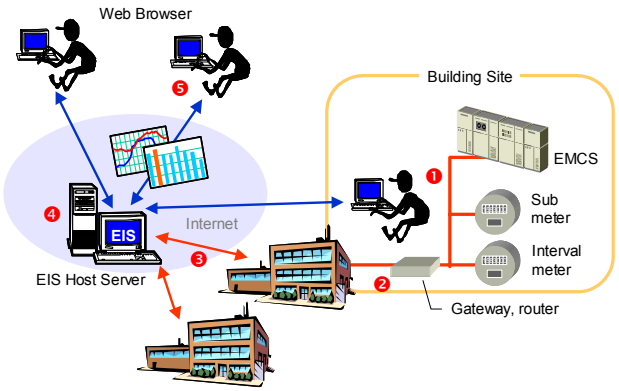

Figure 1: Energy Information System

Enterprise Energy Management

Energy Information System (EIS) requires the following capabilities; collect and archive facility energy data, and visualize data in a meaningful fashion. Enterprise Energy Management (EEM) System is one of the various EIS types which is more tied-in to business enterprise information such as; facilitate energy benchmarking, optimize utility procurement, and manage overall energy costs.

2. Site Characteristics

Del Monte chose their food process plant in Modest, CA to install EEM. The Modest Plant has 1.2 million ft^2 of total building area. The maximum demand is approximately 6.5 MW. Annual electricity consumption was --- GWH, annual gas consumption was --- Therm, and annual energy cost was $--- in 2004. Utility cost of industrial facilities takes significantly larger portion of entire business cost compared to that of commercial buildings.

Requirement for EEM

Addition to the common EEM data management, visualization and analysis features, Del Monte requested several key features which are critical to their plant operation. First, the EEM has to be capable to manage data of WAGES (water, compressed air, gas, electricity, steam) category. Second, the interoperability between the EEM and the existing systems has to be established. Currently the Modesto plant has an Enterprise Asset Management System (EAM) and forklift battery charger system. The data from these systems has to be fed into the EEM system as well. Third, the EEM system has to be expandable for potential nationwide installation and networking. Del Monte views this EEM installation to Modesto Plant as a pilot project for future nationwide installation.

3. Vendor Selection

Role of LBNL in this project was to work with Del Monte to develop a specification for the EEM, including specific data collection needs for the key industrial systems, to compile a list of EEM vendors, and to evaluate their products by various criteria. The final vendor selection was made by Del Monte. EEM vendors listed up by LBNL were up to 27 vendors, and evaluation process took several steps from preliminary to final. The preliminary evaluation was done by reviewing the vendors' website followed by telephone interview

to the vendors. The secondary evaluation was to ask vendors to answer a questionnaire form prepared by LBNL. The questions include vendor profile, connectivity, metering, integration, data security, data visualization and analysis, graphical display, demand response, utility procurement management, financial analysis, and reporting capability. The filtering criteria were based on Del Monte's requirements and LBNL expertise. Although many detail questions were asked on features of data analysis web-base tools, experience and strength in industrial grade metering and control products.

By the secondary evaluation, the vendors were filtered down to 4 candidates. For the final evaluation process, Del Monte sent request for proposal (RFP) to the 4 vendors. Prior to the RFP, web demonstration were also conducted. LBNL helped Del Monte evaluate the proposals. Through the RFP evaluation process, one vendor couldn't provide requested features within the budget allowance. The web demonstrations of the other 2 vendors were somewhat unfocused on EEM features as a pre-developed tool. The winning vendor's demonstration covered most of what Del Monte requested, and showed flexibility for future software feature expansion. Moreover, their proposal had thoughtful bid.

Interesting findings from the process were; 2 vendors survived in the final partnered each other for this project, and the winning vendor company was purchased by the other finalist vendor company during the evaluation process. This shows dynamic changes of current EIS industry.

4. Final Design

Key monitoring points are; gas flow from utility portal meter, main electric meter, power consumption at water pump, water pressure and flow, airflow from the single common header of air compressors. Since the existing meter equipments were not capable to communicate with the data network, new industrial grade meter equipments were installed for each monitoring points.

Cost Estimate

Figure 2 shows cost estimate of the winning vendor's proposal. Total cost is $126,000, includes $66,000 of base system (server and software) and $7,900 per monitoring point (metering hardware, installation, configuration). The base system cost will not significantly increase by additional monitoring points. In future expansion, these base system cost will be reduced or eliminated. Cost per monitoring point depends on existing meter equipments and quality of meter data desired.

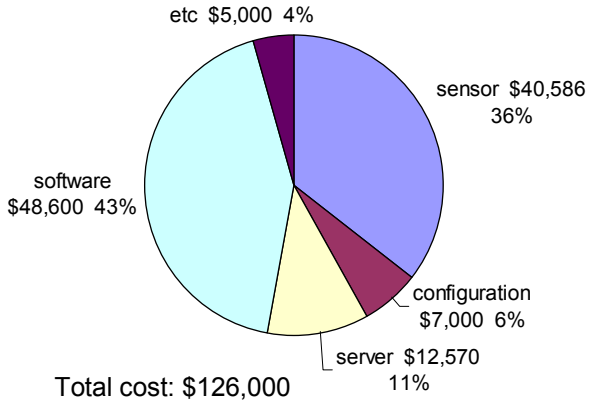

Figure 2: Breakdown of EEM Installation Cost

5. Post-Installation Analysis

LBNL is planning to conduct post-installation analysis of the first harvest season after the EEM installation. The analysis will include energy data trended by EEM, findings from the data, and interview to the operators about usability of the EEM.

6. Consideration

Through out the survey and evaluation, we found energy and facility managers of industrial production sites have urgent or potential needs of utility data management tools, and EEM systems have great potential to help them run their facilities more efficiently. However, the market for EEM is still immature, and not many products are available. Moreover, the customer awareness and demand for EEM system is low. Promotion of successful installations of EEM will help increase development of EEM market, and will eventually make energy management of industrial sector more efficient.

References