Implementing a Web-Based EMIS at a Midwest Utility

by Iqbal Javed

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Ever-increasing environmental regulations, financial risk disclosures, emerging greenhouse gas (GHG) reporting, and other stakeholder pressures make environmental compliance management and reporting a complex and tedious task. According to a 2001 study by BTI Consulting Group, 66% of environment, health, and safety (EH&S) managers' time is spent on information gathering, sorting, and sharing, which forces the industry to spend 64% of an average US$80 million environmental management budget on these efforts.[1] To address these issues, a growing number of environmentally proactive companies turn to environmental management information systems (EMIS). An EMIS is a software application that gathers, communicates, manipulates, analyzes, reports, and stores EH&S data to meet a company's compliance and performance tracking needs.[2]

Alliant Energy Corporation is a regulated, investor-owned public utility holding company providing electric and natural gas service to approximately one million electric and 400,000 natural gas customers in the upper Midwest states of Iowa, Wisconsin, and Minnesota. In the mid-1990s, Alliant Energy developed an in-house EMIS to manage air, water, and waste compliance data. However, due to high cost of system maintenance and upgrades, like other industry leaders, Alliant Energy decided to turn from in-house applications to third-party EMIS solutions.

EMIS Vendor Selection Process

Alliant Energy established a small team of EH&S and information technology (IT) staff to perform a needs analysis study, as well as to evaluate and shortlist vendors offering systems that met the company's needs and expectations. The team conducted a business needs analysis for a software pilot, documented system expectations and success criteria (see Table 1), and began exploring suitable EMIS software vendors.

The team short-listed four vendors, who were then asked to provide proposals outlining how Alliant Energy's needs would be met by their respective systems. These vendors were provided with EMIS needs and a conceptual design flow diagram for a pilot proof-of-concept. Two vendors, both with Web-based EMIS platforms, provided proposals that met the company's needs. The first offered to develop a pilot implementation at a significant upfront cost. The second vendor, Enviance, demonstrated how Alliant Energy's conceptual design could be deployed on its Web-based EMIS platform to meet the company's needs in a cost-effective manner, while still meeting IT security requirements.

Enviance's Software-as-a-Services (SaaS) system was selected because of the functionality and flexibility that the Web-based solution offered. The SaaS platform allows for a low capital investment, a rapid implementation cycle, a low IT resource burden, and a seamless interface among various EH&S media that could be integrated with Alliant Energy's other systems. The annual subscription fee, based on the number of users, includes system maintenance and upgrades.

System Structure

Figure 1 shows the overall system structure. The Alliant Energy system tree (the left pane in screen shot) consists of *Locations & Programs*, which includes all facilities configured; *Citations*, which includes applicable citations and rules; *Documents*, which includes all site permits; and *Reports*, which covers regulatory compliance and corporate reporting. These parts of the EMIS system were developed by the Alliant Energy's EH&S and IT staff. The horizontal tabs display the key EMIS functionalities (see Figure 1):

- *Desktop* tab displays permit limit warnings, incomplete tasks;
- *Calendar* tab displays tasks and their status in a calendar format;
- *Messages* tab displays any system messages, command log, or regulatory notices;
- *Tasks* tab is for creating and editing tasks and e-mail notifications;

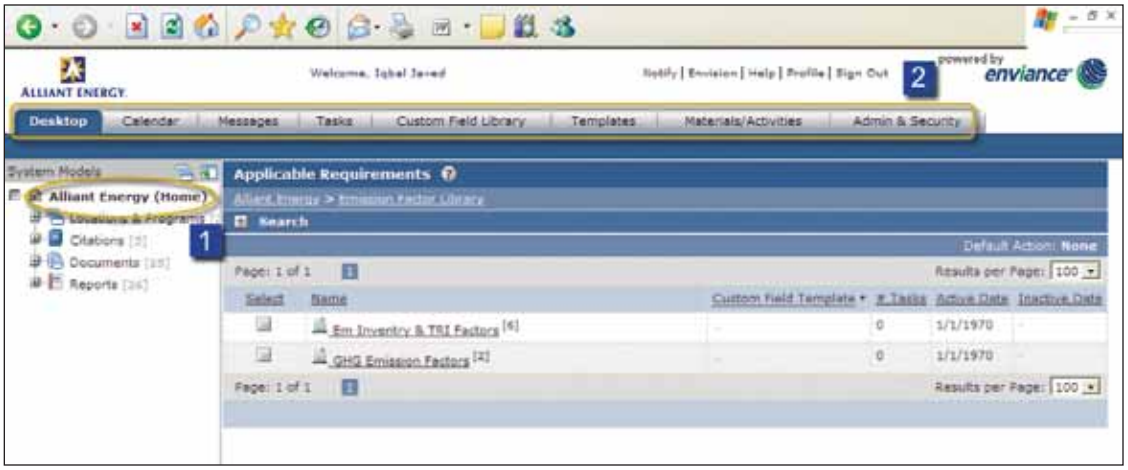

Figure 1. *EMIS structure.*

- *Custom Field Library* and *Templates* tabs allow the company to configure forms and system requirements;
- *Materials/Activities* tab allows entering complex calculations; and
- *Admin & Security* tab allows managing system users and their specific access and permissions.

Subscribers of the EMIS system build customized solutions based on the specific needs of their organization. The system's functionalities allow an organization to start from almost nothing and build a system comprised of hundreds of facilities, units, pieces of equipment, and requirements.

Pilot Deployment

Enviance's SaaS system was selected because of the functionality and flexibility that the Web-based solution offered.

The three facilities selected for pilot implementation of the EMIS ranged from 250- to 750-MW coal-fired power plants located in two states. The system's initial configuration included facility data input, boiler and combustion turbine setup, ash and fuel management, Title V emission inventory data, Toxic Release Inventory (TRI) data, National Pollutant Discharge Elimination (NPDES) wastewater discharge monitoring report management, waste management, facility compliance task management, emission factor library, byproduct utilization, and regulatory and corporate EH&S reports.[3,4] The pilot implementation took six months and was completed in the third quarter of 2004. The time required for implementation varied from 290 to 440 hours per facility, depending on facility size. This included staff training on data loading and system use. The continuous emissions monitoring and power generation systems were mapped for automatic periodic data loading.

The flow diagram shown in Figure 2 depicts the EMIS system's standard configuration for Title V emission inventory and TRI management. Generally, the EMIS system configuration should coincide with a facility's process flow diagram; however, generic configuration should not over burden data loading and manipulation.

Implementation

Starting in January 2005, the enterprise-wide system implementation included coal-fired power generation plants, gas- and oil-fired plants, and combustion turbine peaking units, spanning three states[5] The rollout for the 50 facilities featured 21 Title V permits, 13 NPDES permits, and numerous tasks for Spill Prevention and Counter Control (SPCC) and Storm Water Pollution Prevention (SWPP).

The strategy was to clone a system already configured for a like-kind facility and then make changes in the configuration as needed to fit each facility specific requirements. This significantly reduced resource needs, as compared to starting from scratch for each facility. It took approximately 4800 hours to complete the enterprise-wide implementation. The system roll-out was achieved by the end

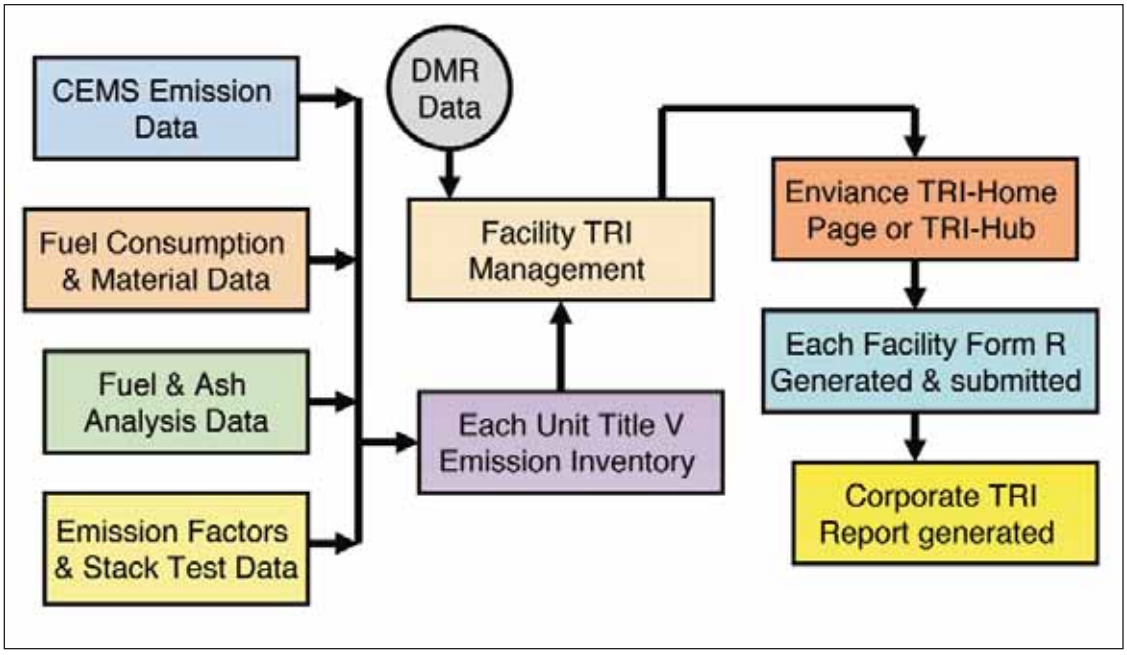

Figure 2. *Title V and TRI data flow.*

Table 1. EMIS needs.

Minimum Functionality Required
• Manage emissions data for air, water, and waste, and generate various reports
• Wastewater management
• Automatic e-mail notification when permit limits are exceeded
• Track EH&S compliance tasks and generate e-mail notification when a task is incomplete
• Track hazardous, universal, and other waste management
• Meet emerging regulations
• Provide EH&S performance indicators for EMIS
• Meets U.S. Department of Energy's 1605b reporting and other GHG protocol-based reporting
System Expectations
• Manual data entry and importing of data from other systems
• Real-time notifications for proactive corrective actions
• User-friendly interface and straight forward navigation
• Reporting transparency and consistency
• Data securely stored and accessible
• Scalable technology
• Ease of integration with other systems
• Meets IT technical standards
Success Criteria
• Visible management support and commitment
• Sufficient support of facility management
• Sufficient resources assigned to the project
• Good communication to the rest of organization
• Staying within the defined scope of the project
• All deadlines met in a timely manner

of 2005, and the EMIS went live in January 2006.

Key EMIS Functionalities

Below is a brief overview of how Alliant Energy uses the EMIS for data loading, automatic notification, incident recording, and regulatory and custom report configuration and use.

Task Management—All EH&S tasks are configured and assigned in the EMIS with e-mail notification reminders.

Event Management and Permit Limit Exceedance Notification—The EMIS event setup includes automatic air and water limit exceedance notification and manual entry for events such as spills and other environmental incidents.

Data Loading—Each facility's continuous emissions monitoring and generation management data is integrated into the system for automatic uploading daily at midnight. Manual data entry occurs through a Microsoft Excel interface. The system generates an Excel spreadsheet for a specific plant (point of interest), and the assigned staff fills in the data and uploads the spreadsheet to the system at the push of a button.

Report Setup—The system allows configuration of an Excel, HTML, or PDF report directly on a specific regulatory form by mapping the data link from the "Locations and Programs" section directly into the "Reports" section. Reports are linked to data in the EMIS and get updated every hour. Creating and deleting a report does not affect the main data repository. More than 500 reports are in the system at the corporate and facility levels.

Lessons Learned

For an effective EMIS it is extremely important that operational processes, technology, and users are all aligned, otherwise any pitfalls in these fundamental requirements will reduce the EMIS's value and efficiency. In Alliant Energy's case, process maps and technical guidelines were developed to clearly define responsibilities and accountabilities for the effective use of the system. Furthermore, hands-on staff training on system use and online technical support are provided on an ongoing basis.

A good tip is to have a thorough understanding of the plant's process and data collection needs before proceeding. Loading one set of data helps perform a preliminary assurance that calculations are generating required outputs accurately for use in data repositories and reports. One hurdle faced was convincing staff internally that a system operating outside the company firewall and interfacing with the company systems is as secure and robust as company's own server-based systems.

Conclusions

An effective EMIS can reduce risk by improving EH&S compliance, data, and reporting management. This requires the EMIS to be developed systematically from needs analysis to system selection to a final deliverable, while meeting business needs, existing and emerging regulatory needs, and the company's EH&S management structure. This is a painstaking effort that involves a thorough understanding of business needs and exploring the market to find the best fit according to a company's needs analysis. A hasty decision may result in selection of a system that either lacks required capabili-

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ties or has numerous unnecessary features that may be costly to modify or remove. With proper research, Alliant Energy was able to select a system that was configurable to the company's needs by EH&S staff without much IT involvement or burden.

It is much more efficient and cost-effective to begin with a pilot implementation at one or two representative facilities than it is to start with a full implementation, since system fixes and adjustments can be easily made during the pilot. Selecting consistent data sources with active involvement of all stakeholders, establishing nomenclature protocols, calculation processes, and system layout at an early stage in the process reduces extensive adjustments and reworks at later stages. Hands-on training for system users at different stages of the implementation increases system acceptance and use.

The main advantage of a flexible design is that the system is built on the basic emission building blocks along with more complex requirements, such as the TRI repository, as a combination of basic building blocks. Expanding the system for GHG management proved that if a flexible Web-based EMIS platform is developed carefully, it not only aligns well with existing business processes to reduce EH&S risks for the company, but also continues meeting emerging needs. Alliant Energy's flexible system approach paid off in 2007 when the system was expanded seamlessly to include management of GHG inventories.[6,7] These inventories are based on GHG protocol and reporting needs, such as the Chicago Climate Exchange, The Climate Registry, and the U.S. Environmental Protection Agency's Climate Leaders Program. em

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