EMFACT Case Study

Background

Energy and Materials Flow and Cost Tracker (EMFACT™) is a software tool designed to be used by manufacturers for systematically tracking materials and energy use - releases, discharges, wastes, products, and associated costs - in ways that can create value for their business. The tool can provide a comprehensive picture of resource use and its relation to production and planning that can help improve both business and environmental performance.

NEWMOA and the Massachusetts Office of Technical Assistance and Technology (MA OTA), the project partners created EMFACT™ because the agencies recognized the need and opportunity for manufacturers to more effectively implement environmental management accounting as a key tool to aid in setting pollution prevention priorities, identifying value-added opportunities for sustainable production, and implementing materials and energy efficiency improvements. EMFACT™ can be a useful adjunct for compliance assurance, quality management, lean manufacturing, environmental management systems, productivity and resource efficiency improvements, and preventing accidents and losses.

EMFACT™'s benefits to its users are:

- Easy navigation and data management
- Connecting material inputs and all outputs, including products, wastes, and other environmental releases to estimate mass balances and flows
- Effective tracking of all material inputs, including chemicals, commodities, and fuels, and their associated costs
- Effective tracking of all wastes, wastewater discharges, and air emissions
- Automated reminders and notices about upcoming reporting and other deadlines
- Automated reports on materials use efficiency and environmental releases
- Easy transfer of data to spreadsheets for further analysis and reports

As a tool for better understanding and optimizing resource use, EMFACT™ merges the aims of environmental performance and lean manufacturing to reduce unnecessary wastes and costs. For more information about EMFACT and its capabilities, visit http://www.newmoa.org/prevention/emfact/.

NEWMOA, with funding from EPA Region 2, undertook an effort to pilot EMFACT with companies in New York and New Jersey interested in improving their understanding of the materials flow and associated costs within their processes. The purpose of this effort was to

demonstrate EMFACT™'s functions and reports and capture the results from firms that have deployed the tool. With assistance help from the New Jersey Department of Environmental Protection (NJ DEP), Office of Pollution Prevention and Community Right To Know, NEWMOA identified a pilot company in New Jersey. The pilot company expressed interest in gaining a more granular understanding of their waste generation and hazardous air emissions with the aim of improving internal cost tracking at the production line level. They requested confidentiality for this case study, which NEWMOA granted.

Scope of Pilot

In 2011, NEWMOA contacted the pilot company to explore their interest in EMFACT and introduce staff to EMFACT's capabilities. From these initial discussions, a letter of agreement was developed describing the roles of each party under the pilot and the services available from NEWMOA and its contractor, Sullivan International Group. NEWMOA agreed to provide the following services under the letter of agreement:

- Coordination with pilot company environmental, health, and safety (EHS) staff to identify software and data needs and design an EMFACT training workshop;
- Assistance with downloading and installing EMFACT on the firm's computers;
- Training for the EHS staff on EMFACT and how to deploy and use the software;
- Follow-up to address questions and provide support and assistance with EMFACT use;
- Coordination with technical assistance providers in New Jersey to help with any pollution prevention challenges or projects that the pilot company wanted to address and track the results of using EMFACT; and
- Drafting of a case study on the results of the company's use of EMFACT for six months to a year.

The pilot company agreed to provide the following:

- Communications on the EHS data and software needs of the company;
- Assistance with planning an EMFACT workshop and making the logistical arrangements onsite, including finding a room with computers to hold the session;
- Identifying a contact person for follow-up after the training for questions and assistance from NEWMOA and NEWMOA's contractor;
- Reporting results on the use of EMFACT six months to a year after the workshop;
- Participation in an interview on the company's use of EMFACT and lesson learned six months to a year after the workshop; and
- Comments, corrections, and suggestions on a draft case study write-up.

Once the letter of agreement was executed, the group scheduled the onsite training session. The pilot company, with support from Sullivan, installed EMFACT on the company's computers.

Onsite Training and Installation Support

NEWMOA and Sullivan staff traveled to the pilot company's headquarters for a day long training session on installing, setting up, and using EMFACT. The pilot company EHS staff and Information Technology (IT) staff participated in the hands-on training. New Jersey Department of Environmental Protection Office of Pollution Prevention and Community Right to Know staff who oversee the State's Pollution Prevention Planning program attended as well. While onsite the group toured the pilot company's facilities to better understand the company's manufacturing processes and the flow of materials through the plant.

The training covered:

- Introduction to EMFACT
- Discussion of the pilot company's EHS software needs, challenges, and connection to EMFACT
- Overview of EMFACT navigation
- Overview of EMFACT Functions
- Hands-on exercises using pilot company data

The pilot company was particularly interested in installing EMFACT as a shared network resource and integrating it with their existing database resources to help them work across buildings and departments. EMFACT is not currently configured off-the-shelf to be installed as a network resource, and doing so would require the pilot company to do a customized installation. IT staff discussed using internal staff resources to configure EMFACT to function this way. They decided to pilot the software at the desktop level and to evaluate a network deployment after the pilot.

There was additional discussion on the ability to import data from the company's internal data management system into EMFACT. The current off-the-shelf EMFACT product allows for importing purchasing data in a prescribed format. A template is available to facilitate this process. During the training, the trainers demonstrated this capability. However, the pilot company was also interested in importing other types of data, such as waste haul tipping fees. NEWMOA and Sullivan described how additional import capabilities could be developed, as long as data dependencies were accounted for, but the particular functions that the pilot company wanted were not available in EMFACT at the time of the training.

Pilot Company Needs Assessment/Options Analysis

Prior to the training session, the pilot company staff generated a list of potential projects based on internal priorities and workflows targeted for improvements. They shared these ideas during the training. Following the onsite session, the pilot company staff met to continue discussing potential projects based on their increased understanding of EMFACT's capabilities and updated information on the availability of staff resources. These projects included:

- Tracking of hazardous air emissions for reporting under their Title V Air Operating Permit (i.e., log sheets), and
- Tracking dumpster pick-ups by building and production unit for internal cost accounting/charge-backs.

The pilot company decided to pursue the dumpster pick-up project initially, as it had significant potential to improve their workflow in this area and they were actively working to find a better solution to address their challenges. Additionally, this waste haul/cost tracking project was less data intensive and less complicated than the Title V log sheet project and posed an easier pilot project given limited EHS staff resources.

The existing workflow for solid waste tracking involved staff at each building completing stand-alone spreadsheets and periodically submitting them to EHS. EHS staff then compiled these spreadsheets and reconciled them with the invoices from the waste haulers to assess costs to the appropriate cost centers. The staff spent a considerable amount of time compiling and reconciling their information with the waste hauler data, and they wanted to reduce the time involved with this activity. They were interested in exploring the use of EMFACT to centrally manage this data and benefit from more robust report generating capabilities.

Pilot Trial

The pilot company began setting up EMFACT for solid waste tracking by working through an example solid waste tipping fee receipt. The activities included:

- Defining a department responsible for one of its product lines;
- Defining a piece of equipment by adding to the "Equipment List" a roll-off solid waste container;
- Defining "outputs" for Waste Types on the "Waste Type List", one of which is associated with the defined piece of equipment (they added details to the waste type using the appropriate New Jersey waste code, since it dictates the tipping fee and unit cost);
- Linking the equipment to the outputs for that roll-off solid waste container; and
- Running a waste report for the defined waste.

The EHS staff identified the following issues during this trial:

- When defining the waste type list, the units are cost per pound of waste in whole dollars and cents. The pilot company's tipping fees are in dollars per ton and vary for different waste streams. Differences in tipping fees by waste stream are lost when rounding to dollars per pound.
- Waste management and transporters are separate vendors in some instances. In the waste activity detail entry form of EMFACT, there is a field for waste vendor but no separate field for transporter. It was important to the pilot company to have both waste management and transporter vendors listed because both are needed for reporting solid and hazardous waste under EPA's Toxic Release Inventory (TRI) reporting.

- Cost Savings in Waste Activity Reports would be inaccurate due to rounding issues described above.
- Equipment Code and Department Code are needed in the Waste Activity Report to enable allocation of costs to different cost centers/departments.
- The report generating system does not all users to customize reports to include additional data points such as department specific details.
- There is currently no export data capabilities which would allow users to generate customized reports and charts outside of EMFACT.

Sullivan developed a scope of service for the work needed to modify EMFACT to meet the pilot company's needs, with a total cost estimate of $6,000. The pilot company reviewed the proposal and decided not to proceed at time of the pilot.

Follow-up

The pilot company reconvened its in-house pilot team to re-evaluate options for using EMFACT. After some analysis and a successful trial, the group concluded that EMFACT could be used to record and report hazardous air emissions (HAPs) emissions according to air permit requirements for one of their emission units. Again, to be effective in this application EMFACT would need to leverage data from the pilot company's internal data management system, but the initial feasibility analysis appeared to be promising. Unfortunately, due to conflicting priorities and the reallocation of staff resources, the pilot company EHS staff were not able to proceed beyond an initial trial.

Keys to the Future Success of EMFACT

Since the launch of the EMFACT software in January 2011, NEWMOA has interacted with a number of companies in their efforts to install, evaluate, and use EMFACT to track the flow of materials and associated costs within their facilities. These companies have identified some recurring challenges that should be addressed to improve the usefulness of EMFACT, including:

- Upgrading EMFACT so users have the ability to deploy it on a network and it may be accessed from remote desktops while maintaining a single, central dataset for the entire facility;
- Developing a software module that would allow for mapping and importing data from outside sources to the EMFACT data warehouse;
- Providing onsite and/or remote installation support in the event local settings prevent the software from properly installing using the installation wizard;
- Providing ongoing onsite training on the set-up and use of EMFACT; and
- Enabling facilities and companies to modify EMFACT to best meet their needs.

To address the last of these challenges, in 2013 NEWMOA released EMFACT as an open-source software product. By doing so, NEWMOA and MA OTA hopes to empower companies to modify EMFACT to best meet their site-specific needs. Open-source software (OSS)

development communities have become commonplace and provide a way of fostering ongoing development of applications. They can lead to better results than proprietary commercial development models. Open-source development leverages the collective experience, expertise, and resources of those using the software to improve upon it over time. In the case of EMFACT, making the software available as open-source allows companies to leverage each others' work to customize EMFACT and allows individual company users to best meet specific business process needs.

NEWMOA has established an online discussion group of those using and evaluating EMFACT. The intent of this User Group is to foster discussion among EMFACT users on successes, challenges, and opportunities. Users can learn from and build on the experience of others and collectively tackle problems that might be too challenging for individual companies to address. The User Group could ultimately act as an incubator for ideas for future modifications or new features.

NEWMOA and Mass OTA have also created a Developer Group to facilitate discussion of possible code changes and requested feature modifications brought forward from the User Group. The Developer Group provides a forum for virtual brainstorming sessions on codes patches. This discussion forum can also aid in the development of technical specifications for future EMFACT modifications to meet specific business needs.

With the release of the open-source software NEWMOA plans to engage users and developers to continue to advance the vision for EMFACT.