2.5 Full Cost Accounting: What's the Whole Story?

A common problem in waste reduction or pollution prevention projects is getting monetary support from management. People managing waste streams are more likely to face this battle than people in research and development, process engineering, marketing, or others in the organization, who traditionally appear to have a very direct impact on the output and the sale of a product or service. Environmental managers, or others who identify a waste reduction project that might require capital investment, have often been viewed as part of an "overhead" expense category that does not add value to the product or service.

The problem of not recognizing or ignoring the potential for added value from waste reduction projects is rooted in the failure to actualize all cost dimensions. If those costs are identified and quantified, then full cost accounting methods can help managers recognize the project's value.

Getting the Numbers: Control Valve Manufacturer Case Study

This company used conventional solvent-based coatings for valves subjected to exterior exposure. Because of coatings flaws, the valves had a 7 percent refinish rate in the manufacturing process. The paint line generated a significant amount of hazardous waste.

Four employees, consisting of line personnel, the coatings supervisor, and the environmental manager, identified alternative coatings and an application technology that might save money. They presented their idea to management, but it was rejected because it did not show a positive impact on the bottom line. However, they did not give up. Instead, the group did a detailed analysis of the existing and proposed systems, which included a complete accounting of waste costs. With the additional information, they returned to management. By compiling more complete analysis, the group showed a positive impact for the company and management was able to support the changes.

After implementing the coating system, the company virtually eliminated all hazardous waste and related costs from the paint line. They reduced the refinish rate on the line from 7 percent to about one-tenth of 1 percent. The project was so successful that management realized the potential for an entirely new approach to dealing with waste, and the value of searching for waste reduction opportunities. The company developed written policy demonstrating top management support. Also implemented was a standard practice of identifying teams that included production personnel for each identified project or opportunity. Ultimately, the effectiveness of this plant sparked a corporate-wide waste-reduction initiative in the parent organization.

Who Can Use These Cost Accounting Techniques?

Using full cost accounting and other parts of **environmental accounting** is appropriate for large and small businesses, manufacturers, and service sectors. Any type of business in this guidebook, and many others as well, can use this tool to make better decisions about implementing a waste reduction project. The analytical complexity will vary with the size and needs of the project. In simpler cases, it may be enough to use the basic concepts of full cost accounting as a guide to better identify costs. In some cases, as will be shown in this section, the basic analysis can be relatively simple.

Top management support and employee commitment and participation is needed to begin the process. In order to gather the necessary information, a team representing different functions in the organization will be required. The team can include management representatives, the accountant, the environmental or compliance manager, the purchasing agent, production personnel, and others who know about the cost components related to all the activities of producing the product or service.

What is Full Cost Accounting?

The **full cost accounting** (FCA) process identifies all costs associated with a process or product. From an environmental perspective, it may incorporate both the private or internal business costs, and the external or societal costs. For the sake of simplicity, this discussion focuses on internal business costs that could impact a decision about potential cost benefits of different options. A more comprehensive FCA could include external or societal costs that could be significant concerns, and are described in the context of the less tangible costs.

FCA can be used initially as a screening tool for processes that produce a product or service. It identifies all the cost sources of those processes, so some prioritization can be made regarding potential areas of opportunity. For example, if an auto service business examined all the costs associated with its various service components, including the wastes being generated, the business might discover that cleaning solvents were the largest single expense. It may then become the first priority for a complete review of potential alternatives.

At this stage, **cost allocation** is essential. Any process-related cost should be assigned to the cost of a product or service. That may seem obvious, but we have already seen that many businesses have usually written off recognized waste-related costs as overhead, while others are not recognized. The challenge is to find all potential cost trails. Once the team looks in that direction, it doesn't take long to see the hidden cost dimensions that should be "allocated" to the product or process.

This is the time to invoke four cost categories in the search process: 1) direct costs, 2) hidden costs, 3) contingent liability costs, and 4) less tangible costs. If this cost allocation process is not properly completed, other products or services that are more profitable carry the burden of those that generate excess cost.

Once the initial cost allocation effort is complete, FCA can move to the more comprehensive stage of obtaining cost allocation data. In some cases, this could take time if certain costs had not been previously separated. For example, if all solid waste disposed from a company was mixed together with only one expense listed for land disposal costs, it would be impossible to immediately assign cost to the processes most responsible for waste generation. Consider a small computer manufacturer with both solid and hazardous waste sources. A significant cost opportunity was eliminating paper hand towels. While this seemed an unlikely candidate, eliminating paper towel purchase and disposal costs, and converting to laundered towels saved over $9,000. That discovery required waste separation and a cost breakdown.

Total Cost Assessment

Capital budgeting is the process used to plan capital investments. It is in this arena that many environmental projects fail. They do not use proper FCA and cost allocation procedures to effectively compete with other projects for available dollars. In the past, the hidden or less tangible costs have been generally ignored in the processes. Thus other projects prevail that were seen as having a more positive effect on the bottom line.

Capital budgeting compares present operations with a proposed project, or several alternatives based on the costs and revenues of each option. These comparisons are made using selected financial measurement tools to help determine the relative value of each option, keeping in mind the cost of business capital.

For example, a small boat trailer manufacturer was in the middle of upgrading or replacing its paint line. It had three options in mind, but had not taken into account the hidden costs related to wastes that would be generated by each option. After realizing that the environmental costs were a real part of the total process cost, the benefit cost of each option gave a different result. This was a crucial addition to the decision to commit capital to new processes and equipment.

Total cost assessment (TCA) is a capital budgeting tool that allows waste reduction projects to be evaluated using environmental cost data identified with FCA, acceptable implementation timetables, and generally accepted financial measures. TCA, in part, levels the playing field with other capital projects or changes in operations. When evaluating investment choices, companies vary in the choice of measurements or financial tools. Four common tools are payback period, internal rate of return, cost-benefit ratio, and net present value.

1. **Payback period** measures the time it takes to return the investment capital. Businesses look for the shortest payback period and tend to assume it is the best choice. This is not always

true. Long-term investments may have the best return on investment. However, extending financial risk beyond two years has been a difficult hurdle for American businesses to overcome.

2. **Internal rate of return**, also known as return on investment (ROI), is the interest rate that produces a return on invested capital equal to the project's return. For example, the internal investment in a waste reduction project that had a net annual return of 40 percent would be equal to investing in a bank certificate at a 40 percent interest rate.

3. **Benefits cost ratio** is also known as the profitability index. It is calculated by dividing the sum of all present value financial benefits of the project by the present value of all project costs. A ratio of greater than 1.0 means the benefits outweigh the costs, and the project could be justified for implementation.

4. **Net present value** demonstrates the value of a waste reduction project as a present value sum. In this case the present values of all benefits are added. The same is done for all costs. The difference between the two values represents the net value, positive or negative, of undertaking the project.

For sample problems using these techniques, see EPA's, "A Primer for Financial Analysis of Pollution Prevention Projects" or "A Workbook for Total Cost Assessment Cooperative."

The first level of opportunity with environmental accounting techniques is to decide which process options make the most economic sense. This strategy can be extended to the next levels of environmental management to include total quality assessment, life cycle assessment, and design for the environment. These will be explored briefly in Section 2.8.

Sources:

An Introduction to Environmental Accounting as a Business Management Tool: Key Concepts and Terms, U.S. EPA, EPA 742-R-95-001, June 1995.
A Primer for Financial Analysis of Pollution Prevention Projects, U.S. EPA, EPA/600/R-93/059, April 1993.
Finding Cost Effective Pollution Prevention Initiatives: Incorporating Environmental Costs into Business Decision Making, a primer, Global Environmental Management Initiative (GEMI), 1994.

Additional Reading:

Pollution Prevention and Profitability: A Primer for Lenders, Northeast Waste Management Officials Association, Boston MA.
Will Polluting Less Save You Money? A Workbook for Total Cost Assessment, Pollution Prevention Cooperative, 67 Maplewood Ave., West Hartford, CT, 1994.