

TOOL 8. FULL COST ACCOUNTING METHODOLOGY

INTRODUCTION

One of the difficulties in comparing solid waste management (SWM) programs is knowing whether all of the costs of the programs have been taken into account. For various reasons, most communities do not know what their SWM services actually cost, making it difficult to reach sound decisions about SWM options.

Some costs associated with SWM activities, such as environmental and social costs, may not be possible to quantify and no monetary value can be assigned to them. These so-called "economic externalities" make comparisons of SWM options more difficult. However, many costs for which monetary values can be assigned are often not included in cost analyses or they are incorrectly accounted for. Failure to properly account for or estimate SWM costs can lead to poor planning and unexpected difficulties in implementing or operating new SWM programs.

Tool 8 includes some basic information on full cost accounting (FCA) as well as detailed FCA worksheets (TNRCC, 1995) to assist planners in more accurately estimating costs of existing and proposed SWM alternatives/systems. FCA is defined and information is provided on how to accomplish FCA estimates.

BASIC PRINCIPLES OF FULL COST ACCOUNTING

Definition of Full Cost Accounting

FCA, as used here, is defined as "a systematic approach for identifying, summing, and reporting the actual costs of solid waste management, taking into account past and future outlays, oversight and support service (overhead) costs, and operating costs" (U.S. EPA, 1995). The objective of

- **Most communities do not know what their SWM services actually cost.**

- **FCA is a systematic approach for identifying, summing, and reporting the actual costs of SWM.**

FCA is to accurately assess and report the costs of a SWM service or program. FCA is intended to include not only direct costs associated with SWM but also costs that may not be readily recognized such as administrative and other overhead costs. The complete life cycle expenditures to provide SWM services—from planning and construction of facilities through closure and, if needed, post-closure care of facilities—are included in FCA.

Costs Versus Outlays

Another important feature of FCA is its distinction between outlays and costs. Cash outlays may typically occur at the beginning of a project for necessary equipment and facilities to perform a service. These capital investment outlays should not be considered as costs but should, instead, be considered expenditures of cash to acquire resources. Costs refer to the dollar value of resources used and should be spread over the period of service. The cost of a landfill compactor, for example, should be spread over its expected life—perhaps five years or longer. The cost of buildings at a landfill can normally be allocated over the expected life of the landfill. This approach considers costs as occurring when resources are used regardless of when the related cash flows occur.

Failure to properly account for the costs of capital investment purchases is a common mistake made by local governments in estimating costs of SWM services. A typical omission is lost interest from the up-front cash outlays that a government incurs. (This is illustrated in the results of the Wyoming solid waste survey—Tool 2, Table 2-7—where only 29 percent of respondents indicated that they accounted for interest on capital debt in their landfill budgets.) Quite often, only depreciation costs are accounted for by a local government when figuring the costs from capital investment. In some cases, capital investment resources are completely ignored when reporting costs of SWM services.

- FCA considers costs as occurring when resources are used regardless of when the related cash flows occur.

- Failure to properly account for the costs of capital investment purchases is a common mistake made by local governments in estimating costs of SWM services.

Future outlays of cash obligated by SWM services must also be considered in FCA. Future outlays may be required for landfill closure and post-closure care, employee retirement benefits, etc.

Cash outlays for labor and general operating requirements may normally be considered as costs in the year they occur. These outlays usually are made for resources that are used up over a short period of time (i.e., less than one year) and are routinely reacquired to support ongoing operations. The cash outlays therefore occur at about the same time as the use of the resources they are paying for.

HOW TO ACCOMPLISH FULL COST ACCOUNTING

Assembling Information

Using FCA to estimate costs of a proposed or existing SWM service or alternative requires information necessary to account for all up-front, operating and back-end costs. The following steps may be required to obtain the needed information:

- 1) Development of detailed information about the scope of the existing/proposed program. Information concerning the waste stream and its existing or proposed management will be needed. See "Review Current SWM Practices" in Tool 1 for a listing of the types of information needed.
- 2) Inventory of resources required to conduct the program. The equipment, buildings, land, and human resources necessary to conduct the program must be determined.
- 3) Identification of program support services. Administrative and other overhead services providing support to the program must be identified. These will be part time providers as opposed to the full time resources identified in Step 2.

- Future cash outlays for landfill closure and post-closure care should be recognized as costs spread over the operating life of the landfill.

- It is necessary to account for all up-front, operating and back-end costs.

The information obtained in these steps will be needed to allocate and account for all of the costs of providing a SWM service. The steps that must be taken from this point to properly determine the costs of a SWM program/system are described below.

Allocating Cash Outlays

The distinction between cash outlays (or cash flows) and costs was addressed in the previous section. Costs of a resource should be allocated over the period in which the resource is used—sometimes several years—regardless of when the cash outlay for the resource occurred. Likewise, back-end expenditures necessary to complete a SWM service should be allocated over the period when service is provided.

Spreading the cost of resources—acquired with capital investment outlays—over time should consider both lost interest/return on the cash invested and depreciation of the resources (i.e., equipment/facilities). This may be accomplished through “amortization,” a method of determining costs (e.g., annual costs) associated with up-front and future outlays. A “capital recovery factor,” reflecting an interest rate and expected years of service for a resource, may be multiplied by the up-front cash outlay for the resource to arrive at an annual cost for its use. This mechanism is used to retire home mortgage debt and provides a levelized cost estimate that accounts for both interest cost and depreciation.

A similar approach may be used to spread the cost of future (i.e., back-end) cash outlays over the period of SWM service resulting in their need. This may be accomplished through the establishment of periodic (e.g., annual) deposits

- **Costs of a resource should be allocated over the period in which the resource is used**

- **The cost of capital investment includes lost interest on the cash and depreciation of the resources acquired.**

designed to cover the future outlays. An example is the need for an annual deposit to cover the future cash outlay for landfill closure. Levelized annual deposits may be developed by multiplying a "sinking fund deposit factor", reflecting an interest rate and expected years of landfill operation, by the expected future outlay. The annual deposit may be considered as the annual cost of the landfill closure. Although more complex to determine, an escalating annual deposit reflecting inflation expectations may also be developed to cover this future outlay.

As previously noted, routine cash outlays for day-to-day expenses (labor, maintenance, etc.) may be considered as equivalent to costs since the resource acquired is being used at the same time.

Accounting for Overhead and Hidden Costs

Overhead costs associated with running a SWM program may be defined as management and support costs. Management and support labor costs should be accounted for along with a proportionate share of the office (e.g., rent, office equipment, utilities) costs incurred for management and support. Specifically, overhead costs for a SWM program can include:

- management
- payroll and accounting
- executive oversight
- personnel
- advisory/coordinating groups
- purchasing
- billing services
- records management
- clerical support
- training expenses
- data management
- legal services

Some overhead costs will be for SWM services exclusively while other overhead costs will be shared with other services. For example, the cost of a solid waste advisory committee are exclusive

- **Levelized annual deposits to cover future cash outlays can be developed by multiplying a "sinking fund deposit factor" by the expected future outlay.**

- **Some overhead costs will be for SWM services exclusively while other overhead costs will be shared with other services.**

to SWM whereas the cost of the payroll and accounting department may be shared between several municipal programs.

Shared overhead costs must be apportioned appropriately in FCA. Shared costs can normally be allocated in proportion to a SWM program's number of personnel or budget relative to other governmental services. For example, if the SWM personnel in a municipality represent 20 percent of all municipal personnel (exclusive of the support services staff), then 20 percent of support service costs may be allocated to SWM. Alternatively, budgeted costs for a specific program as a percentage of the total municipal budget (exclusive of support services) may be used to calculate the support service costs allocated to the program.

It is also important in FCA to include costs that are not always considered as such. Hidden costs can include the costs of activities or resources that appear to be free. For example, gifts of capital and equipment are sometimes made to support a program. As such, they may not be included in a determination of the costs of the program. These assets have value, however, which is consumed over time. Thus, there is a cost when using these gifts which should be included in a FCA approach.

Total System Costs

As noted in Tools 1 and 4, total SWM system costs should be considered when comparing waste management alternatives. For example, determining the cost effectiveness of adding a recycling alternative to a SWM system is not simply a matter of comparing the cost of recyclables processing (after revenues) with the current cost of landfilling. As explained in Tool 4, refuse collection and landfilling costs must be recalculated and added to the recyclables recovery costs to determine the cost effectiveness of the new system. This reflects the fact that reducing quantities landfilled may not result in a

- Shared overhead costs must be apportioned appropriately in FCA.

- FCA also includes hidden costs such as the costs of activities or resources that appear to be free.

- Determining the cost effectiveness of adding recycling to a SWM system is not simply a matter of comparing the cost of recyclables processing (after revenues) with the current cost of landfilling.

proportionate reduction in refuse collection and landfilling costs.

Thus, an important part of FCA is recalculating the cost of all SWM system/program elements when a new element is added. Summing the costs of all system elements will be necessary to compare systems containing different alternatives.

Exhibit 8-1 contains a list of cost items that may need to be included when estimating/accounting for the cost of a given element of a SWM system. Not all of the items listed will be included in each element. However, Exhibit 8-1 can be used as a checklist when estimating costs using a FCA approach. In addition, detailed FCA worksheets are included and described below.

Full Cost Accounting Worksheets

In order to conduct full cost accounting, a system needs to be developed for collecting cost data. This Handbook contains a series of worksheets (TNRCC, 1995) designed to determine the costs associated with all of the costs incurred in a public SWM program. The worksheets can also be used as a tool to establish SWM service rates which reflect the full cost of providing SWM services. The forms were originally developed for a wide variety of cities in Texas. They have been slightly modified to be used by a wide variety of Wyoming solid waste programs. Like Texas, Wyoming has no mandates to conduct full cost accounting; it is done strictly on a volunteer basis.

The worksheets include three summary forms and fourteen data collection forms that may be used by a city, county or disposal district to compile detailed cost and volumetric data. Forms A and B and Forms 1-13 may be used to determine the cost of the SWM program. For those programs that have more than one class of customers (e.g. residential, commercial, etc.). Form C and Form 14 will help to determine the program costs by customer class.

- **Summing the cost of all SWM system elements will be necessary to compare systems containing different alternatives.**
- **FCA can be used to establish solid waste service rates.**

Conducting FCA and completing the worksheets does not require that cities, counties or districts establish their SWM service rates based on this approach. Rather, it is a tool that is made available to those communities that believe they will benefit from using FCA and these forms to develop their solid waste customer charges and tipping fees.

The following forms are included in this Handbook:

Summary Forms

Form A	Program Cost Summary
Form B	Rate Calculation Summary
Form C	Customer Class Cost Summary

Detailed Cost Information Forms

Form 1	Salaries, Wages & Benefits
Form 2	Monthly Vehicle Expense Report
Form 3	Annual Vehicle Expense Report
Form 4	Capital Costs
Form 5	Other Landfill Costs
Form 6	Predevelopment & Construction Costs
Form 7	Closure & Post-Closure Care Costs
Form 8	General Operation & Maintenance Costs
Form 9	Other Costs
Form 10	Indirect Costs - Method I: Internal Assessment Allocation
Form 11	Indirect Costs - Method II: Employee Based Allocation

Detailed Volume Information Forms

Form 12	Monthly Materials
Form 13	Annual Materials

Detailed Customer Class Allocation Form

Form 14	Customer Class Costs - Detail
---------	-------------------------------

- Both summary and detailed worksheets are provided in this tool.

The forms in this Handbook are designed to provide a generic process so that they can be used by a wide variety of SWM programs. Depending on the local SWM program, these forms may need to be modified to include program specific FCA line items. Preceding each of the forms 1-14, is an explanation of terms as it applies to that form (TNRCC, 1995). This enables any person completing the forms to know what is being asked for in each line item and provides consistency within and between programs.

- Using FCA requires diligence in identifying all costs and in properly estimating and allocating those costs.

Summary

Using FCA in SWM planning, or to account for the actual costs of an existing system, requires diligence in identifying all costs and in properly estimating and allocating those costs. The cost of each element (refuse collection, recyclables collection, processing, disposal, etc.) of an existing or proposed system must be determined and summed to arrive at the total system cost.

Exhibit 8-1		
POTENTIAL COST ITEMS IN FULL COST ACCOUNTING OF SWM SYSTEM ELEMENTS		
Up-Front Cost Items	Operating & Maintenance Cost Items	Back-End Cost Items
Program Planning	Labor (wages, salaries, fringes)	Closure
Land	Insurance (buildings, equipment)	Post-Closure Care
Site Development	Property Taxes	Retirement Benefits
Facilities	Licenses	Overhead (administrative, office, other)
Equipment	Maintenance	Other
Engineering	Fuel	
Construction Management	Utilities	
Interest During Construction	Rents/Leases	
Legal Fees	Residue Disposal	
Financing Fees	Overhead (administrative, office, other)	
Permitting	Public Education & Promotion	
Outreach	Contract Services	
Start-up	Financial Assurance	
Other	Other	

Note: Outlays for up-front and back-end cost items should be appropriately spread over the operating life of the system element they apply to, as described in "Allocating Cash Outlays".

