



## TRAINING MANUAL 3 FINANCE AND COST RECOVERY

### MODULE 3-2: ANALYSIS OF EXISTING MSWM COSTS AND REVENUES

Prepared by the International Consortium  
GTZ-ERM-GKW

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## MODULE OBJECTIVES

- The objective of this module is to introduce participants to the process of establishing the actual costs of existing services and of proposed changes to those services.
- It distinguishes between expenditures and costs, and introduces the concept of recurrent costs within the framework known as full cost accounting.
- These concepts are illustrated by way of a simple example.

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Experience shows that municipalities and waste management agencies rarely know the full costs of the services they provide. This is because the services are not run as separate financial areas but are often a department of the municipality, responsible for direct operating costs only. This means that key cost items, such as office overheads and maintenance costs are often excluded (maintenance being the function of another department). Also, little or no accounting is done regarding capital expenditures and annual capital costs.

Cash basis accounting systems recognise expenditures on capital assets only at the time the transaction takes place. Concepts such as depreciation, where the value of the asset is spread across its useful life, are frequently not addressed. As a consequence, the costs reported by waste management agencies normally reflect only the direct expenditures for which they are directly responsible. Depreciation, debt service, office overheads and other 'central' expenditures often go unrecorded.

This module has the purpose of providing delegates with a simple, logical and systematic approach through which full service costs can be calculated.

Before doing this, some accounting terms are explained: costs, expenditures, recurrent costs and full cost accounting.



## OVERVIEW: WHAT ARE YOUR EXISTING COSTS?

- What are 'costs' and what are 'expenditures'?
- What are 'recurrent' costs?
- What is 'Full Cost Accounting'?
- Example: Calculating existing costs

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This chart provides an overview of the course contents.



## 'COSTS' AND 'EXPENDITURES'

- What are 'costs' and what are 'expenditures'?
- Expenditures relate to actual cash outlays (i.e., a transaction is involved).
- Costs relate to the use of economic resources (where a transaction is not necessarily involved).
- This is an important distinction when determining the full annual COSTS (as opposed to expenditures) of providing waste management services.

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The distinction between costs and expenditures is an important one.

Expenditures relate to actual cash outlays – transactions.

Costs relate to the utilisation of resources. Thus, part of the cost of using a refuse collection vehicle for one year is the value of the vehicle 'used up' in that period. This is generally referred to as 'depreciation'. The fuel and labour used to operate the vehicle are BOTH costs and expenditures (i.e., resources are used and cash transactions are involved).

Note that EXPENDITURES made on capital items, such as on a new waste collection vehicle, are translated into annual COSTS through the depreciation process.

Examples of expenditures (or cash outlays) are

- Operation and maintenance (O&M) expenditures made as part of day-to-day operations (labour, fuel).
- The interest payments made on loans.

Examples of costs are

- Depreciation
- Provisions made (funds put aside) today to finance future expenditures resulting from today's activities (e.g., landfill closure – costs are incurred today, the expenditure is made in the future)
- Operation and maintenance (O&M) expenditures (because annual expenditures are also costs)
- The interest payments made on loans (as above).



## RECURRENT COSTS

- The costs to be funded annually by the WM agency
  - These generally include direct O&M costs.
  - They can also include other costs, such as head office overheads, depreciation and loan interest.
  - The extent to which they do depends on the financial policy of the WM agency.
  - This relates to the concept of 'Full Cost Accounting'.

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Recurrent costs are discussed in greater detail in module 3-4 on financing.

Fundamentally, the recurrent costs of the service are all of the costs listed in the slide. i.e. O&M, depreciation, head office overheads, provisions for future liabilities, etc. These are costs that are actually incurred as a result of the waste management activities.

The distinction is made here, however, between those recurrent costs for which the waste management agency is directly responsible and those for which it is not. This relates to the level of financial autonomy enjoyed by the agency.

The remaining costs not funded by the waste management agency are funded either:

(1) by the municipality (for example, a vehicle maintenance depot may be responsible for maintaining all municipal vehicles under its own budget; these costs may or may not be passed on to the waste management agency and recorded against the costs of service). Head office overheads are another example of costs that are frequently not allocated to the service provider.

or

(2) they may be deferred until the future and left for others to fund (e.g., the replacement of waste collection vehicles or landfill closure).



## FULL COST ACCOUNTING

- FCA is a systematic approach for identifying, summing and reporting the actual annual COSTS of waste management. It takes into account:
  - Past and future capital expenditure outlays (translated into annual depreciation and amortisation costs)
  - Overhead costs
  - Operating and maintenance (O&M) costs, and
  - Interest payments
- The sum of these costs equals the total recurrent costs (but not necessarily expenditures) incurred today as a result of today's operations.

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This slide reinforces the earlier discussion.



## Know Your Costs: Full Cost Accounting (2)

- ❑ Local governments traditionally use 'cash basis' accounting methods. This records income and expenses when they occur.
- ❑ FCA is an 'accrual' system of accounting that recognises costs when resources are used or committed (regardless of the money spent).
  - Using the cash basis approach, the purchase of a collection vehicle is recognised as one expense on the day the truck was purchased.
- ❑ Under the FCA approach, the expense of the truck is spread over its life (i.e., it is depreciated). Thus the cost of the vehicle is the annual depreciation applied against its value.

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This slide notes the distinction between 'cash basis' accounting and 'accruals' accounting. This is largely reflected in the discussion to this point on the differences between costs and expenditures. Note, however, that this applies also to incomes. In 'cash basis' accounting incomes are recognised at the time payments are received. Under a 'accruals' accounting they are recognised when they are earned.

FCA is effectively another way of describing accruals accounting.

The benefits of FCA are that:

- It identifies actual service costs (including unit costs).

- It helps avoid 'peaks and troughs' in cash expenses (if budgeting is done on an FCA basis).

- When linked to cost recovery FCA ensures that money is available when it is needed.

- It is an invaluable aid when contracting services (because the full costs are known).

- It is an analytical tool, allowing WM agencies to account for and scrutinise each component of SWM services (e.g., for head office, collection, transport, disposal, recycling).

- It can be used as the basis for benchmarking – measuring performance and comparing it with benchmarks for similar activities elsewhere.

Depreciation is an accounting concept whereby the value of an asset – e.g. a waste collection vehicle – is recovered over its operational life and is treated as an annual cost.

i.e. part of the annual cost of providing WM services is the value of the assets used up each year as a result of providing the services.

The extent to which costs such as depreciation and loan interest payments are treated as part of the recurrent costs to be funded by the WM agency depends on the financial powers and policy of the municipality and the financial policy of the WM agency.

Financial policy is addressed further in Training Course TM3-5.



## CALCULATING EXISTING COSTS AND REVENUES

- Collect Accounting Data
  - Existing Revenue Sources
  - Existing Costs
  - Operating Costs and Overheads
  - Capital Costs
- Capital Budgeting
- Operational Data
- Cash Flow Analysis

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The source of the pro-forma tables and example used in the remainder of this module is the Preliminary Draft SWM Privatisation Procedural Manual, September 29, 2002, prepared as part of the Egypt SWM Project for the Egyptian Environmental Affairs Agency and USAID by About Associates Inc., SCS Engineers, The Institute of Public-Private Partnerships and Community and Institutional Development, Inc. Some modifications have been made to the materials for ease of presentation.

For further details of the methodology and example presented here, please refer to the source document – available as part of the online project materials.

This slide sets out the components of the cost assessment process and the structure used for developing the example.





## Collect Accounting Data (1)

- The first step is the collection of accounting data, which refers to all revenue and expenditure activities.
- Identify all current revenue sources
- Identify all existing costs
  - Operating costs
  - Capital costs

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Revenue sources, operating costs and capital costs are covered in the following slides.



## Collect Accounting Data (2)

- Existing Revenue Sources
  - List all existing sources of revenue (e.g., direct and indirect user charges, municipal transfers, sales and contracts).
  - Income is later allocated among the principal SWM activities: street cleaning, waste collection, waste transfer and transport, disposal, monitoring and enforcement, support services.

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The aim is to identify all existing sources of revenue and to allocate them – where feasible – to specific applications. Tables for organising this information follow.

## Collecting and allocating revenue data

Organising income framework for SWM						
Activity	Direct user charges	Indirect user charges	Municipal transfers	National transfers	Sales	Contracts
Waste collection						
Waste transfer and transport						
Waste disposal						
Compost plant						
Street cleaning						
Totals						

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The aim is to identify all existing sources of revenue and to allocate them – where feasible – to specific applications. Tables for organising this information follow.



## Collect Accounting Data (3)

- Existing Costs
  - Identify all costs, many of which would not have been recognised under a cash-basis accounting system:
    - Direct operating and maintenance costs
    - Overhead costs
    - Capital costs (depreciation and interest repayments)

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These three generic cost items are addressed in the following slides.



## Collect Accounting Data (4)

- Operating Costs and Overheads
  - The principal operating costs of doing business are:
    - Operations and Maintenance (O&M) costs, and
    - Debt service costs (interest payments on loans)
  - These can be divided into:
    - Direct expenses: attributable to the principal activities
    - Indirect expenses: costs incurred in support of the principal activities (often referred to as overheads)
  - These costs are allocated to appropriate expense accounts and summarised in expense framework

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The following two charts give examples of expense account categories and an indicative expense framework for recording these expenses.



## Examples of expense accounts

Expense account	Description
Labour	Wages/salaries of employees. Include all employee benefits, such as health insurance, pensions, etc.
Vehicles & equipment	Costs of operations of vehicles, including fuel, oils and lubricants, maintenance, etc.
Rent or lease payments	Examples are amounts paid for leasing land for landfill, transfer stations, offices etc.
Contract services	Expenses of contracting for specific services, such as street sweeping, recycling, etc.
Loan service	Interest payments on any loans taken out for the principal SW management activities.
Other payments	Any other type of payment not described above.

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The following two charts give examples of expense account categories and an indicative expense framework for recording these expenses.



## Example Operating Expense Framework

Activities		Financial Accounts						Total
		Labour	Vehicles & equipment	Rent/lease payments	Contract services	Loan interest	Other payments	
Direct expenses	Collection							
	Landfill							
	Etc.							
	Sub-total							
Indirect expenses	Accounting							
	Billing							
	Payroll							
	Etc.							
	Sub-total							
Total								

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The following two charts give examples of expense account categories and an indicative expense framework for recording these expenses.



## Collect Accounting Data (5)

- Capital Costs
  - Most assets in a SWM system usually consist of vehicles, equipment and facilities that have useful lives in excess of one year
  - The cost of these assets is spread over their useful lives
  - That is, the assets are depreciated and each year's depreciation constitutes the cost of the asset in that year.
  - These costs are commonly called 'capital costs'.

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The slide is self-explanatory.





## Collect Accounting Data (6)

- Capital Costs (2)
  - Legal guidelines usually govern the depreciation of assets (see table).
  - Depreciation is not an expenditure – it is a cost – funds set aside for debt repayment and asset replacement.
  - An inventory of assets should be established and maintained so that the costs related to these resources can be properly allocated.

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The following two slides give examples of asset lives (the basis for calculating depreciation allowances) and a simple example of a capital assets register.



## Example depreciation allowances

Description	Number of years depreciated
<i>Buildings</i>	<i>20 – 25 years</i>
<i>Machinery</i>	<i>10 – 15</i>
<i>Vehicles</i>	<i>10</i>
<i>Furniture</i>	<i>10</i>
<i>Electronics and computers</i>	<i>5</i>

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The following two slides give examples of asset lives (the basis for calculating depreciation allowances) and a simple example of a capital assets register.



## Example of Capital Assets Inventory

Vehicle and Equipment Inventory Framework						
Activity		Quantity	Purchase or lease	Date acquired	Cost	Remaining life
Collection	Equipment					
	Compactors					
	Micro trucks					
Transfer	Loaders					
	Transfer vehicles					
	Crane					
Disposal	Weighing scales					
	Graders					
	Bulldozers					
	Dump trucks					

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The following two slides give examples of asset lives (the basis for calculating depreciation allowances) and a simple example of a capital assets register.



## Capital Budgeting

- Capital budgeting is the process of anticipating capital expenditures at future dates and planning for the outlay
- The capital budgeting plan plays an important part in forecasting cash flows and setting solid waste tariffs that take account of future capital expenditures

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Note again the emphasis on anticipating future capital expenditures as an input to the process of calculating future tariffs.

The objective is to plan in advance future capital expenditures (resulting either from the replacement of plant that has reached the end of its nominal life or to provide additional assets in order to meet expanding service needs).

This information will be used to allocate the costs of using these assets (ie, depreciation provisions) to activity in each year.



## Capital Budgeting – Collection Vehicle Example (1)

<i>Budgeting period</i>	11 years
<i>Depreciation period</i>	10 years
<i>Annual household formation growth rate (%)</i>	3%
<i>Inflation rate (%)</i>	4%
<i>No of households Year 1</i>	27,000
<i>No of collection vehicles in Year 1</i>	9
<i>Ratio of collection vehicles to households</i>	1 : 3000

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## Capital Budgeting – Collection Vehicle Example (2)

Year	Outlay	Depreciation							
		1	2	4	5	6	8	10	11
1	2,225,000	225,000	225,000	225,000	225,000	225,000	225,000	225,000	
2									
5	292,465				29,247	29,247	29,247	29,247	29,247
7									
8	328,980						32,898	32,898	32,898
10									
11	3,833,840								383,384
Total	3,833,837	225,000	225,000	225,000	254,247	254,247	287,145	287,145	445,529

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## Collect Operational Data

- Operational data relates to specific details of the area covered by the waste management services.
- It can include demographic information, numbers of households and commercial premises, average annual waste quantities, collection methods and frequency.
- This is used to monitor, assess and improve current operations and to plan future requirements.
- Examples of the kinds of indicators that can be produced from this data are listed in the next slide.

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This information will be used to allocate the costs of using these assets (ie, depreciation provisions) to activity in each year.



## Collect Operational Data: Typical Indicators

- Crew size per collection vehicle, by neighbourhood
- Vehicles needed per number of households and commercial premises, by neighbourhood
- Fuel costs per vehicle/year
- Maintenance costs per vehicle/year
- Fuel and maintenance costs per vehicle/hour of operation
- Labourers/km for manual street sweeping.
- Km/day of street sweeping machine.

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This information will be used to allocate the costs of using these assets (ie, depreciation provisions) to activity in each year.



## Cash Flow Analysis

- ❑ **Prepare revenue and expenditure forecasts (pro-forma income and expense statements)**
  - Draws on the accounting data, capital budgeting plan and operational data developed in the previous steps.
- ❑ **First, build an operational forecast model setting out the underlying factors driving future system requirements and financial statements.**

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The objective is to plan in advance future capital expenditures (resulting either from the replacement of plant that has reached the end of its nominal life or to provide additional assets in order to meet expanding service needs).

This information will be used to allocate the costs of using these assets (ie, depreciation provisions) to activity in each year.



## Operational Forecast Model: Assumptions

Annual inflation rate	4%
Annual household formation growth rate	3%
Current number of households in service area	27,000
Households per collection vehicle	3000
Crew size per collection vehicle (non-driver)	3
Wages for crew (including benefits) per day	20
Wages for driver (including benefits) per day	24
Overhead rate (% of total labour)	20%
Hours of operation per day per vehicle	10
Fuel and maintenance costs per hour	30
Collection frequency (per week)	6

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The objective is to plan in advance future capital expenditures (resulting either from the replacement of plant that has reached the end of its nominal life or to provide additional assets in order to meet expanding service needs).

This information will be used to allocate the costs of using these assets (ie, depreciation provisions) to activity in each year.



## Cash Flow Analysis (2)

### □ Second, prepare income and expense statements:

- (1) as basis for tariff calculation under municipal operation
- (2) as basis for tariff calculation under private operation

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Note again the emphasis on anticipating future capital expenditures as an input to the process of calculating future tariffs.

The objective is to plan in advance future capital expenditures (resulting either from the replacement of plant that has reached the end of its nominal life or to provide additional assets in order to meet expanding service needs).

This information will be used to allocate the costs of using these assets (ie, depreciation provisions) to activity in each year.



### Income and Expense Statement for Government Operation

	Pro-forma income and Expenses Statement: Government Operation						
<i>Income</i>	1	2	4	5	7	9	10
Indirect charges	223,274	230,765	270,065	284,107	330,299	359,196	401,343
Transfers	300,000	312,000	337,459	350,958	379,596	410,571	426,994
Required tariff	872,180	889,518	1,080,380	1,140,602	1,394,476	1,475,208	1,580,056
<b>Total Income</b>	<b>1,395,464</b>	<b>1,442,285</b>	<b>1,687,903</b>	<b>1,775,671</b>	<b>2,064,371</b>	<b>2,244,975</b>	<b>2,508,392</b>
<i>Expenses</i>							
Labour	245,307	255,119	306,597	318,060	379,367	410,324	465,531
Administration	49,061	51,024	61,319	63,772	75,873	82,065	93,106
Fuel & maintenance	876,096	911,140	1,094,986	1,138,787	1,354,883	1,465,442	1,662,610
Depreciation	225,000	225,000	225,000	254,247	254,247	287,145	287,145
<b>Total Expenses</b>	<b>1,395,464</b>	<b>1,442,285</b>	<b>1,687,903</b>	<b>1,775,671</b>	<b>2,064,371</b>	<b>2,244,975</b>	<b>2,508,392</b>

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Note again the emphasis on anticipating future capital expenditures as an input to the process of calculating future tariffs.

The objective is to plan in advance future capital expenditures (resulting either from the replacement of plant that has reached the end of its nominal life or to provide additional assets in order to meet expanding service needs).

This information will be used to allocate the costs of using these assets (ie, depreciation provisions) to activity in each year.



### Income and Expense Statement for Private Operation

	Pro-forma income and Expenses Statement: Private Operator/Shareholder Funded						
<i>Income</i>	1	2	4	5	7	9	10
Indirect charges	223,274	230,765	270,065	284,107	330,299	359,196	401,343
Transfers	300,000	312,000	337,459	350,958	379,596	410,571	426,994
Required tariff	1,322,190	1,349,518	1,530,379	1,649,099	1,859,973	2,049,507	2,254,354
<b>Total Income</b>	<b>1,845,464</b>	<b>1,892,283</b>	<b>2,137,903</b>	<b>2,284,164</b>	<b>2,569,868</b>	<b>2,819,274</b>	<b>3,082,691</b>
<i>Expenses</i>							
Labour	245,307	255,119	306,597	318,060	379,367	410,324	465,531
Administration	49,061	51,024	61,319	63,772	75,873	82,065	93,106
Fuel & maintenance	876,096	911,140	1,094,986	1,138,787	1,354,883	1,465,442	1,662,610
Depreciation	225,000	225,000	225,000	254,247	254,247	287,145	287,145
<b>Total Expenses</b>	<b>1,395,464</b>	<b>1,442,283</b>	<b>1,687,903</b>	<b>1,775,666</b>	<b>2,061,370</b>	<b>2,244,975</b>	<b>2,508,392</b>
<i>Net Income (20%)</i>	450,000	450,000	450,000	508,498	508,498	574,299	574,299
<i>Shareholders equity</i>	2,250,000	2,250,000	2,250,000	2,542,465	2,542,465	2,871,448	2,871,448

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Note again the emphasis on anticipating future capital expenditures as an input to the process of calculating future tariffs.

The objective is to plan in advance future capital expenditures (resulting either from the replacement of plant that has reached the end of its nominal life or to provide additional assets in order to meet expanding service needs).

This information will be used to allocate the costs of using these assets (ie, depreciation provisions) to activity in each year.



## Conclusions

- ❑ Establishing the full costs of waste services requires the systematic assembling of operational and financial data on the services, now and in the future.
- ❑ This is a painstaking task and one that requires the full commitment of the municipality for reliable estimates to be produced.
- ❑ It also requires the municipality to collect the socioeconomic data needed to plan future service needs.
- ❑ It can be the first step in introducing a higher level of financial and operational autonomy into the waste management service.

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Note again the emphasis on anticipating future capital expenditures as an input to the process of calculating future tariffs.

The objective is to plan in advance future capital expenditures (resulting either from the replacement of plant that has reached the end of its nominal life or to provide additional assets in order to meet expanding service needs).

This information will be used to allocate the costs of using these assets (ie, depreciation provisions) to activity in each year.