Network of Associations of Local Authorities of South-East Europe
Réseau des Associations de Pouvoirs Locaux de l'Europe du Sud-Est

giz Open Regional Fund for South East Europe

Cost and Finance Model

Users Manual

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Contents

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Regional Expert
Milena Radosevic

International Expert
Reka Soos

Local experts
Danijela Djurovic, Union of Municipalities of Montenegro
Irem Silajdzic Association of Municipalities and Cities of the Federation of Bosnia and Herzegovina
Miodrag Gluscevic Standing Conference of Towns and Municipalities - Association of Local Authorities in Serbia
Tatiana Tugui, Congress of Local Authorities from Moldova

Editorial board:
Kelmend Zajazi, NALAS Executive Director
Đorđe Staničić SCTM Secretary General
Viorel Furdui CALM Executive Director

With the support of:
Milena Garthley, NALAS Program Officer
Irina Luncashu, CALM Project Coordinator

List of Abbreviations

C&T	-	Collection and Transport
CALM	-	Congress of the Local Authorities from Moldova
CFM	-	Cost and Finance Model
HH	-	Household
MBT	-	Mechanical Biological Treatment
NALAS	-	Network of Associations of Local Authorities in South-East Europe
NALAS SWM TF	-	NALAS Task Force on Solid Waste Management
NC	-	National Currency
ORF	-	Open Regional Fund
RDF	-	Refuse Derived Fuel
SEE	-	South-East Europe
SWM	-	Solid Waste Management
VAT	-	Value Added Tax
WM	-	Waste Management

1. Introduction

Cost and Finance Model (CFM) in the field of waste management is a web-based spreadsheet application developed to support local governments and their public utility companies in South Eastern Europe (SEE) to get better overview of their waste management cost structure. Conceptually CFM is based on typical Waste Management activities like collection, transport, separation and disposal. Thus it helps the local authorities to understand the costs of each activity separately and enables a better cost management. The Model can also serve as a tool for identification and appreciation of the general financial data of the waste management systems of the local governments and possibly help them define and apply policies aimed at ensuring the quality of service to the citizens at a lower cost.

CFM incorporates European and regional experiences since it is based on local, regional and international expertise and was piloted in different countries at the level of public utility companies in four municipalities of the region. It represents a means for organized collection and storage of waste management data at the local level and therefore it is the first step towards introduction of benchmarking. CFM can also be used as an important tool in decision making process, particularly in the area of waste management tariff setting policies.

CFM was developed in the scope of NALAS Solid Waste Management Task Force (SWM TF) in a project supported by GIZ Open Regional Fund for Municipal Services (ORF) and implemented jointly by NALAS and The Congress of the Local Authorities from Moldova (CALM). Four other local government associations were involved in the project implementation: Association of Municipalities and Cities of the Federation of Bosnia and Herzegovina, Association of Municipalities of the Republic of Croatia, Union of Municipalities of Montenegro, Standing Conference of Towns and Municipalities (Serbia). Project implementation lasted 10 months, from April 2012 until February 2013, and included four local experts, one regional and one international expert.

Development of CFM leaned significantly on results and findings of two preceding projects designed and implemented by NALAS:

1. Development of a model/methodology for the establishment of an integrated information system on Solid Waste Management in SEE (SWIS), implemented in 2011.

   The SWIS model is a tool designed for municipal waste management data collection and analysis and is intended to be used by public entities in charge of the provision of this service. It helps local governments to collect and process relevant data on the most important questions in municipal waste management.

2. Development of a Manual for Efficient Sanitary Landfill Management (LFM), implemented in 2011.

   The Manual presents the analysis of the current status of municipal waste disposal in the region, examples of good practice and offers recommendations for improvements.

During the project the NALAS SWM TF dealt with identification of major common problems in the field of waste management in SEE but also looked for solutions that could be applied on the broader regional basis.

At the problem level it was concluded that solid waste management in SEE is characterized by a number of system deficits with regard to the legal/regulatory framework, the institutional and organizational set-up, the refinancing cycles as well as the physical infrastructure. Furthermore, these deficits lead to incomplete, inconsistent and fragmented work processes in the solid waste management sector and create inefficient subsystems which endanger organizational, financial and environmental sustainability.

One obvious problem that burdens waste management in SEE can be seen in the fact that the knowledge about "waste chains" from waste creation to final waste land filing or incineration is incomplete. In other words the "physical model" of solid waste management is incomplete or partially unknown. As a consequence, the cost of different components in "waste chains" – as far as these are known – cannot be estimated with the needed exactitude. This can be considered as one of the core problems in solid waste management practice in Southeast Europe today.

Another significant problem of the waste management in the region is a fragmented financing policy that is unable to sustain and improve the existing waste collection and disposal services. The source of income for waste management is usually a combination of public administration's budget and fee charges.

The incomplete physical model, the incompletely defined cost structure and fragmented financing policy cause gaps and distortions in the refinancing basis of solid waste management. There is neither a solid basis for defining tariffs nor can the need for budget allocations be defended. It may happen that certain components are under-financed while others are over-financed. The deficits in the financing system hamper the delivery of services in solid waste management. For this reason constant analysis and planning in the field of waste management at the local level is essential.

In order to address the mentioned issues NALAS developed a comprehensive cost and financing model (CFM) for solid waste management adapted to the conditions and the context in the countries of SEE. The model was designed in the way it can be introduced as an organizational framework in different municipalities of the region improving key business processes of solid waste management by determining what the costs and the level of efficiency of existing systems are.

2. Possible use of the CFM

Both CFM and the Manual are intended for users in public utility companies and other waste operators but also for professionals in local self-government administrations in charge of waste management issues.

The whole waste management system in the region works on an unsustainable long-term setting. On the one hand public utility companies in this field are expected to operate positively (without incurring losses, which means at least a minimum accumulation) in order not to burden the already overburdened budgets of local governments, while, on the other hand, the same companies are seen as a pillar of social protection of those with a lower income. That automatically implies non-economic principles in the formation of the prices of the services. This dual position of companies in the waste sector leads to:

- Low quality of services that often deviates from accepted standards and regulations;
- Cross-subsidizing of losses by covering them from different public sources;
- Impossibility to start new development programs in public utility companies, because revenues cover only current liabilities and maintenance, while the mechanisms for the system development is transferred to higher level of responsibility i.e. to local authorities or state.

For those reasons, the CFM model is designed to enable users to identify major components of waste management system, get an overview of resources that public utility enterprise is using, better understand where costs emerge and allocate costs by different activities in the waste management chain (collection, transport, treatment and disposal).

CFM can be a useful tool for determining the quantitative base for setting tariffs for full cost recovery as

part of sustainable financial system for waste management in the framework of a wholesome local policy for waste management. From national and regional perspective, the Model can provide the local government associations and the local governments with further arguments for the improvement of the legislative framework as it will reveal factual data on the real situation on the ground. As CFM is meant to be used by the local governments from the whole region, the Model can be also used as a tool for benchmarking in SEE.

The model can be used by waste operators to determine actual costs of their operation by entering data from balance sheets and reports but also to plan by different scenarios by entering projected data. In this way operators can foresee costs that are going to arise from their operations and thus define appropriate price for their services. Furthermore, departments within local administration responsible for communal services can monitor the efficiency of the company, its performance and decide whether the planned price is justified or not.

Use value of CFM can be recognized in following respects:

- Identification of all costs that emerge
- Identification of WM activities where costs emerge
- Understand where each cost emerges and if it's justified
- Identification of the hierarchy of decision making process, responsibilities and possible positive or negative financial effects
- Standardization of the format for the collection of information in the region
- Introduction of modern practices for data collection and organization in the waste management
- Promotion of professional networking among local governments and operators across SEE region
- Facilitation of the exchange of information between local authorities and waste operators
- Support to local governments in human resources capacity building through training
- Comparison of levels of service and performance at local, national and regional level
- Comparison of key performance indicators with the international benchmark points
- Exchange of experiences in terms of system optimization

CFM can assist local authorities through:

- Organized collection and processing of information in the field of waste management
- Assistance in obtaining a clear picture of the state of waste management
- Contribution to the methodological and organizational framework of the municipal waste management
- Presentation of a starting point for reflection and planning further steps of improvement of waste management system at the local or regional level

In operational terms CFM can be used for:

- Monitoring of municipal waste collection and transportation current costs
- Defining elements for finance investments in equipment and vehicles
- Monitoring the efficiency of municipal companies or operators

3. How to Use the CFM

CFM is a web-based spreadsheet application that is available on NALAS web pages. Each user can register and obtain an ID and password directly in the web page. NALAS has the responsibility to ensure that all entered data are secure and accessible only by the registered user.

3.1. Model Overview

CFM itself is developed in a spreadsheet format consisting of four worksheets out of which two are designed for data input, one for automatic calculations and one for display of indicators. The basic CFM principle is that relevant data about all elements of municipal waste management is entered only once in the designed cell in the input worksheets, in the "Input" sheet and in the "Inventory" sheet. Data is then used for calculations in the "Calculations" sheet. On a separate "Indicators" sheet costs of waste management service are divided between 4 different groups of indicators.

3.2. Data Entry

Data entry within the Model is organized in two sheets. "Input" is the first data entry sheet and it organizes the most important data while the second one "Inventory" collects information about public utility company assets.

The two data entry sheets make the basis for the "Calculations" sheet where data are automatically combined and calculated by the formulas integrated in the Model. Finally, collected and organized data are presented in "Indicators" sheet through sets of SWM indicators.

Not all the data entered into the Model will be used for calculation since there are fields designed for input of narrative descriptions. The Model is structured in such a way to achieve systematical organization of all important information about the public utility company in one place.

Users should be aware of some important notes while using the Model:

- Insert data that refer to your communal enterprise;
- Cells that do not refer to specific case should be left empty;
- Insert only data that is related to municipal solid, non-hazardous waste collection, treatment and disposal;
- Insert costs with VAT.

3.2.1. Input (Worksheet 1)

Input is first of two data entry sheets in the Model and it is users' first encounter with the CFM. The purpose of it is to collect data and give an overview of the public utility company activities, organizational structure, business and social environment that it is working in as well as its expenses and revenues, human resources and work distribution. The data entered into this sheet ranges from information about users, going across general and technical information all the way to data on operational costs.

The first task in the "Input" sheet is to enter basic information about the company. Start by entering the year to which data refer to and then move on to fill all other cells. As shown in Figure 1, Model allows the user to check specific WM services that are performed by the communal enterprise.

Year:		
0	**User information**	
	Date of data input in the model (dd/mm/yy)	
	Name of communal enterprise	
	Owners of the communal enterprise	
	Address	
	Name and position of the person performing data input in the model	
	Contact email address	
	Contact telephone number	
	Services provided by the comunal services in Waste Management (please check the boxes):	
	Sweeping	
	Mixed waste collection	
	Transfer station and transfer	
	Selective collection	
	Treatment	
	a) recycling yard	
	b) sorting	
	c) composting	
	d) MBT	
	Landfilling	

User Information entry - Figure 1

Section 1 "General Information"

The next section refers to Section 1 "General Information" and is divided in three subsections as shown in figures 2 and 3, Subsections are "1.1 Local Area Data", "1.2 Accounting Information and Unit Costs" and "1.3 Source of Revenues".

Respectively columns refer to:

- Column B = Title of the section, subsection or required data or information
- Column C = Format in which data is entered (for example narrative description or national currency per year)
- Column D = Data entry
- Column E = Description of data quality by entering O or E ("O" stands for official information and "E" for estimate)
- Column F = Source of information

A	B	C	D	E	F
1	**General information**				
1.1.	**LOCAL AREA DATA**	Format of the input	INPUT	Official information= O Estimate=E	Source of information
	Which authority is responsible for local WM?	narrative description			
	In which administrative areas/towns/municipalties is the WM service provided?	narrative description			
	Total administrative area	km^2			
	Administrative area covered by WM service	km^2			
	Population in the area	number			
	Population served by WM services	%			
	Population density	$people/km^2$			
	Average number of people in a household	number			
	Average household income	NC/year			
	Average income per capita in the area covered by service	NC/year			
	Road infrastructure in the service area (low to high - 1 to 5 and narrative description)	narrative description			

In the Section 1.3. “Sources of Revenue” if there are revenues that are not listed please insert them in the next available line under the title “Other”:

A	B	C	D	E	F
1.2.	**ACCOUNTING INFORMATION AND UNIT COST**	Format of the input	INPUT	Official information= O Estimate=E	Source of information
	Budget for WM services in the last year, investment and operation	NC			
	Budget for WM services in the last 3 years, investment and operation	NC			
	How are WM costs accounted for in the municipal budget?	narrative description			
	Does the communal enterprise provide other services beside WM?	Y/N			
	Is WM accounting done together with other services?	Y/N			
	If the answer to the previous question is yes, please provide an estimate (%) of the	%			
	What is the exchange rate? 1 NC = ? Eur	Euro			
	Is depreciation on equipment linear or accelerated	choice			
	a) if accelerated, please provide depreciation key	%			
	b) number of years for which an accelerated depreciation is applied	number of years			
	c) salvage value as % of purchase value of equipment (if applicable)	%			
	Price of diesel paid by the communal enterprise	NC/liter			
	Price of petrol paid by the communal enterprise	NC/liter			
	Price of diesel oil paid by the communal enterprise	NC/liter			
	Price of gas paid by the communal enterprise	NC/liter			
	Price of electricity paid by the communal enterprise	NC/kWh			
	Price of water paid by the communal enterprise	KM/m3			
	Price of wood paid by the communal enterprise	NC/m^3			
	Does the company charge VAT on the bills?	Y/N			
1.3.	**SOURCES OF REVENUE**	Format of the input	INPUT	Official information= O Estimate=E	Source of information
	User charge	NC/year			
	Sale of recyclable materials/compost/energy	NC/year			
	Subsidisation: national, regional, local government	NC/year			
	Providing special services in WM (collection of waste on call, etc.)	NC/year			
	Other (specify):	NC/year			

Accounting Information and Unit Costs and Sources of Revenue - Figure 3

Section 2 "Technical Information"

Section 2 "Technical Information" (shown in figures 4 and 5) is reserved for "2.1. Street Sweeping", "2.2. Collection and Transport","2.3. Treatment" and finally "2.4. Disposal/Landfill". While subsections 2.1., 2.2. and 2.4. are straight forward mixture of description info and data entry, the subsection 2.3. "Treatment" consists of several fields designed for data on different treatment options as shown in Figure 5. If the user has a different kind of treatment in the line of operation it is possible to enter data in the next available line under the title "Other":

A	B	C	D	E	F
2	**Technical information**				
2.1.	**STREET SWEEPING**	Format of the input	INPUT	Official information= O Estimate=E	Source of information
	Narrative description of sweeping (where does the waste enter the WM chain)	narrative			
	Type of waste resulting from sweeping	narrative			
	Area covered	m^2			
	Quantity of collected waste	t/year			
2.2.	**COLLECTION AND TRANSPORT**	Format of the input	INPUT	Official information= O Estimate=E	Source of information
	Narrative description of the C&T model used:	narrative description			
	Average compaction rate in collection	t/m^3			
	Waste generation rate	kg/capita/year			
	Quantity of collected waste	t/year			
	Quantity of collected waste from households	t/year			
	Quantity of collected waste from economic agents and institutions	t/year			

Technical information - Figure 4

A	B	C	D	E	F
2.3.	**TREATMENT**	Format of the input	INPUT	Official information= O Estimate=E	Source of information
	Narrative description of the TREATMENT process	narrative description			
	Type of treatment facility	narrative description			
	Owner of treatment facility	narrative description			
	Different treatment services:	Format of the input	INPUT	Official information= O Estimate=E	Source of information
	Recycling yard - different types of waste				
	Platform size	m^2			
	Building	m^2			
	Type of waste accepted for treatment	narrative description			
	Input to recycling yards	t/year			
	Recycleables sold	t/year			
	% refuse by weight	%			
	Sorting				
	Type of waste accepted for treatment	narrative description			
	Input to sorting	t/year			
	Recycleables sold	t/year			
	% refuse by weight	%			
	Composting				
	Type of waste accepted for treatment	narrative description			
	Input to composting	m^3/year			
	Compost sold	m^3/year			
	MBT plant				
	Type of waste accepted for treatment	narrative description			
	Input to MBT	t/year			
	Metal output	t/year			
	RDF output	t/year			
	Refuse to disposal	t/year			
	Other (specify):				
2.4.	**DISPOSAL/LANDFILL**	Format of the input	INPUT	Official information= O Estimate=E	Source of information
	Narrative description of the DISPOSAL model:	narrative description			
	Type of landfill	narrative description			
	Year of opening	number			
	Owner of landfill	narrative description			
	Capacity of landfill	m^3			
	Quantity of landfilled waste per year	m^3			
	Quantity of free space	years			

Technical information continued - Figure 5

Explanations regarding entering data about different treatment options:

- "Input to recycling yard" stands for total quantity of waste that enters the treatment;
- "% refuse by weight" asks for the % of the total quantity of waste that remains after the treatment process ended;
- "MBT plant" is a facility for Mechanical Biological Treatment of waste;
- "Metal output" asks for the quantity of metals separated for recycling;
- "RDF output" stands for Refuse Derived Fuel that was produced in the treatment process;
- "Refuse to disposal" asks for the quantity of residual waste left after the treatment process ended.

Section 3 "Operational Costs Information"

Data entry continues in Section 3 "Operational Costs Information" with first entering staff costs broken down between different blocks of WM service. Subsection 3.1.1. deals with direct labor costs in sweeping and collection and transport. Logic of this subsection comes from the fact that usually same workers are responsible for both street sweeping and collection and transport of the waste. Therefore as shown in Figure 6 first you enter number of full time employees, their average full salary per month and then respectively percentage of time dedicated to specific operation (sweeping, primary collection, secondary collection and selective collection).

Notes:

- *Primary waste collection is a common bin to bin collection characteristic for most municipalities in the region;*
- *Secondary waste collection can occur in some cases when collected waste is first grouped in specific places and then picked and transported by a larger truck to the final destination;*
- *Selective collection stands for the activity of collecting recyclable waste fractions separately at source.*

A	B	C	D	E	F	G	H
3	Operation cost information						
3.1.	STAFF						
3.1.1.	Direct labor cost in Sweeping, Collection and Transport:	Number of full time eqiuvalent employees	Average full salary cost per month per employee	Estimated % of work in SWEEPING	Estimated % of work in PRIMARY collection of waste	Estimated % of work in SECONDARY collection of waste	Estimated % of work in SELECTIVE collection of waste
	Manual street sweepers						
	Waste collector at truck						
	Drivers (including trucks, sweeping equipment)						
	Supervisor						
	Other (specify):						

Direct Labor Costs in Sweeping and Collection and Transport - Figure 6

Entry of data related to staff costs goes on in subsections “3.1.2. Direct labor costs in Treatment”, “3.1.3. Direct labor costs in Landfill” and “3.1.4. Indirect Labor Costs”. In these subsections numbers of full time employees per specific operation (as shown in Figure 7) and their average full salaries per month should be entered.

A	B	C	D
3.1.2.	Direct labor cost in Treatment:	Number of full time eqiuvalent employees	Average full salary cost per month per employee
	Operator at the recycling yard		
	Operator at sorting plant		
	Operator at MBT		
	Supervisor		
	Other (specify):		
3.1.3.	Direct labor cost in Landfill:	Number of full time eqiuvalent employees	Average full salary cost per month per employee
	Unskilled labour engaged at landfill		
	Security personnel		
	Operator at landfill reception		
	Operator at landfill (bulldozer, compactor driver, equipment handling)		
	Supervisor		
	Other (specify):		
3.1.4.	Indirect Labor cost:	Number of full time eqiuvalent employees	Salary expenses for Management/ Administration per month
	Management cost		
	Administration cost		
	Cost with maintenance		
	Other indirect labor (i.e. maintenance, mechanics, please specify):		

Direct and Indirect Labor Costs - Figure 7

Note:

- *According to accounting concept all costs can be divided into direct and indirect ones.*
- *Direct costs are those directly involved in production of goods or delivery of the service, such as direct labor, fuel, debris to cover the landfill every day, etc.*
- *Indirect costs are those that are not attached in a direct way to any activity but are spread across all activities and are supporting direct ones such as management, tax, cost of financing, etc.*

If there are other specific positions in different operations please enter in the next available line under the title “Other”:

Subsection 3.2 “Fuel and Utilities” gives an overview of aggregated annual costs of fuel used by vehicles and costs of utilities like electricity, water, heating fuel and wood. These costs are then divided by percentage between pure service delivery costs and those related to office overheads.

A	B	C	D	E	F
3.2.	FUEL AND UTILITIES	Format of the input	INPUT	Percent used in service delivery and operations	Percent used in office overhead
	Total cost of fuel for vehicles (diesel and gas for fleet and for small cars patrolling)	NC/year			
	Cost of electricity	NC/year			
	Cost of water	NC/year			
	Cost of heating fuel	NC/year			
	Cost of wood	NC/year			

Fuel and Utilities Costs - Figure 8

Continue with data entry about various operations related costs like maintenance and spare parts for mechanic workshop, environmental permits, monitoring costs etc. (see Figure 9). Costs breakdown goes on in subsection “3.4. Office Overheads” where typical office supplies are entered and also PR activities like awareness building campaigns or similar, and subsection “3.5. Third Party Services” which covers activities which are usually subcontracted.

A	B	C	D	E	F	G	H
3.3.	OTHER COSTs RELATED TO OPERATION	Format of the input	INPUT				
	Maintenance costs and spare parts (i.e. repair mechanic shop)	NC/year					
	Environmental Permiting and Monitoring costs for Landfill	NC/year					
	License fee for Collection activities	NC/year					
	Building environmental rehabilitation fund	NC/year					
	Total cost of steff related equipment (i.e. gloves, masks)	NC/year					
	Other (specify):						
3.4.	OFFICE OVERHEADS	Format of the input	INPUT	Estimated % of cost in Sweeping	Estimated % of costs in Collection of waste	Estimated % of costs in Treatment	Estimated % of costs in Landfil
	Office supplies	NC/year					
	Communication (phone, internet, post, etc)	NC/year					
	Awareness campaigns	NC/year					
	Other (specify):						
3.5.	THIRD PARTY SERVICES	Format of the input	INPUT	Estimated % of cost in Sweeping	Estimated % of costs in Collection of waste	Estimated % of costs in Treatment	Estimated % of costs in Landfil
	Research, development of project, feasibility study	NC/year					
	Desinfection and deratisation	NC/year					
	Fire extinguishing, leachate treatment, monitoring, etc.	NC/year					
	Outsourced training	NC/year					
	Technical Assistance to Management	NC/year					
	Cost with leasing equipment (vehicles, etc.) for collection	NC/year					
	Cost with leasing equipment for treatment	NC/year					
	Cost with leasing equipment for disposal	NC/year					
	Renting offices	NC/year					
	Leasing land	NC/year					
	Other (specify):						

Other Costs Related to Operation, Office Overheads and Third Party Services - Figure 9

Entering data into the first sheet ends with data related to taxes, capital costs and financial costs. Finally, as shown in Figure 10, users have the possibility to input any costs that have not been covered by previous subsections.

A	B	C	D	E	F
3.6.	TAXATION COSTS	Format of the input	INPUT	Official information= O Estimate=E	Source of information
	VAT	NC/year			
	Revenue related tax	NC/year			
	Property tax	NC/year			
	Other (specify):				
3.7.	CAPITAL COSTS	Format of the input	INPUT	Official information= O Estimate=E	Source of information
	Depreciation (total) (sum of the two lines below)	NC/year			
	a) depreciation for equipment	NC/year			
	b) depreciation for buildings	NC/year			
3.8.	FINANCIAL COSTS	Format of the input	INPUT	Official information= O Estimate=E	Source of information
	Interest	NC/year			
	Insurance	NC/year			
	Other (specify):				
3.9.	OTHER (specify)	Format of the input	INPUT	Official information= O Estimate=E	Source of information
	Cost of plastic bags used in MIXED COLLECTION	NC/year			
	Cost of plastic bags used in SELECTIVE COLLECTION	NC/year			
	Other (specify):				

Taxation Costs, Capital Costs and Financial Costs - Figure 10

Once you finished entering data into Worksheet 1, move on to next one dedicated to inventory items.

3.2.2. Inventory (Worksheet 2)

The logic of Inventory Worksheet is the same as in previous one and in the whole Model. It follows Waste Management activity blocks and users are expected to enter data on vehicles, machinery, utilities and equipment that the company own and use in collection and transport, treatment and disposal. Users should enter various data like number of units, year of purchase, purchase value, book value etc. Users should start working on this sheet by entering the minimum value in national currency above which an item or an object becomes part of the inventory. As shown in Figure 11, the first data that you enter is related to land and buildings owned by the company.

Note:
In each subsection users can enter as many items as they keep in books separately. One row is reserved for one item whether it is building, land, vehicle, purchase of containers or bins, piece of machinery or equipment. If items can't be displayed separately there is line colored purple at the end of each subsection where users can enter aggregated data instead of breakdown per operation block.

A	B	C	D	E	F
	Inventory			Format	Input
	Value above which an item becomes part of the inventory			NC	
0	LAND AND BUILDINGS				
0	Land and Buildings (specify exactly)	Size in m^2	Purpose of use, choose one from: Transfer station, Landfill, Sorting, Recycling yard	Book value	Remaining useful life

Land and Buildings - Figure 11

Example of Land and Buildings list: Land improvements, Central office, Garage, Industrial platform at transfer station, Building at recycling yard, Warehouse, etc.

Section 1 "Collection and Transport"

Section 1 is dedicated to Collection and Transport. Users should enter vehicle by vehicle that differ by type or year of purchase, then the number of items, year of purchase, expected remaining life cycle from the moment of data entry, purchase and book value in national currency. See figure 12.

A	B	C	D	E	F	G
1	Vehicles (please specify in different rows by type and year of purchase)	Number of units	Year of purchase	Expected useful life from this moment on (years)	Purchase value (NC/vehicle)	Book value (NC/vehicle)

Collection and Transport - Figure 12

Example of Vehicle list: Truck 8t, Truck 12t, Compactor Truck, Skip Truck, Hooklift Truck, Tractor and trailer, Rotopres 12t, etc.

Data entry on vehicles doesn't stop at the column G, it continues with input of data on percentage of time the specific item is used for a particular operation including sweeping, primary collection, secondary collection and separate collection. Colum L is intended for input of information about the type of fuel the specific item is using. For this users are allowed to choose from the dropdown menu in each cell between diesel, petrol, gas, diesel oil or electricity as it can be seen in Figure 13. Finally, data on consumption, estimated mileage and costs of maintenance and technical review are entered.

H	I	J	K	L	M	N	O	P
Estimated % of use in SWEEPING	Estimated % of use in PRIMARY COLLECTION	Estimated % of use for SECONDARY COLLECTION	Estimated % of use for SELECTIVE COLLECTION	Type of fuel used, choose from list	Fuel consumption per 100 km (liter/100 km/ vehicle)	Estimate of mileage per year (km/year/vehicle)	Estimate of cost of regular maintenance and spare parts (NC/year)	Estimate of cost of technical review and insurance (NC/year)

diesel
petrol
gas
diesel oil
electricity

Collection and Transport continued - Figure 13

Data on containers are entered next. Make sure that in this subsection you enter only data related to collection operations. Group containers by purchase orders and type and insert that information as for

an item. For example, if there was an order of 30 pieces of 1100 l containers in 2012, it has to entered in one row as a grouped item and in the “Number of units” column entered “30”. After that, as shown in Figure 14, follow the columns and enter data on year of purchase, expected remaining life span of containers, purchase and book value, percentage of use per specific type of collection and finally maintenance costs.

Note:
Enter purchase and book value of single container in national currency. Estimated maintenance costs are also per container per year in national currency.

A	B	C	D	E	F	G	H	I	J	K
2	Containers (please insert types of containers you have by purchase orders, include only those used in collection)	Number of units	Year of purchase	Expected life span from this moment	Purchase value	Book value	Estimated % of use in PRIMARY of waste	Estimated % of use for SECONDARY of waste	Estimated % of use for SELECTIVE collection of waste	Estimated maintenance cost per unit per year
				years	NC/container	NC/container				

Containers - Figure 14

Example of Containers list: Container 770l, Container 1100l plastic, Container 1100l metal, Container 5m^3, Container 7m^3, Rolo container 25m^3, etc.

In subsection 3 users are expected to enter data on bins. As it can be seen in Figure 15, similar logic applies as in previous subsection with the difference that data on replacement rate should be entered instead of book value. Also this subsection does not include the column for secondary collection but only primary and selective collection. The maximum volume for bins is 370 l.

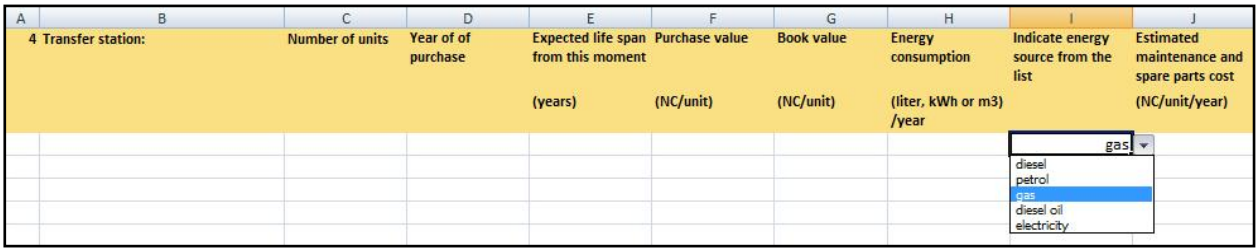
A	B	C	D	E	F	G	H	I
3	Bins:	Number of units	Year of purchase	Purchase value	Replacement rate	Estimated % of use in PRIMARY of waste	Estimated % of use for SELECTIVE collection of waste	Estimated maintenance cost
				NC/unit	%			NC/unit/year

Bins - Figure 15

Example of Bins list: Bin 60l, Bin 120l, Bin 240l, Bin 370l.

Next subsection applies to systems and companies that have transfer stations in operation. Users should enter elements as an item or group of items and then specify number of units per item, year of purchase or constriction, expected remaining life span of transfers station and purchase and book value in national currency. When it comes to energy consumption the amount in specific units per year depending on energy source that can be ticked from dropdown menu should be entered, as shown in Figure 16. Finally, maintenance and spare parts cost in national currency per unit per year is entered.

Note:
Depending on energy source chose liters for diesel, petrol and diesel oil, cubic meters for gas and kilowatt hours for electricity. When it comes to energy consumption the same logic applies for the rest of the worksheet.

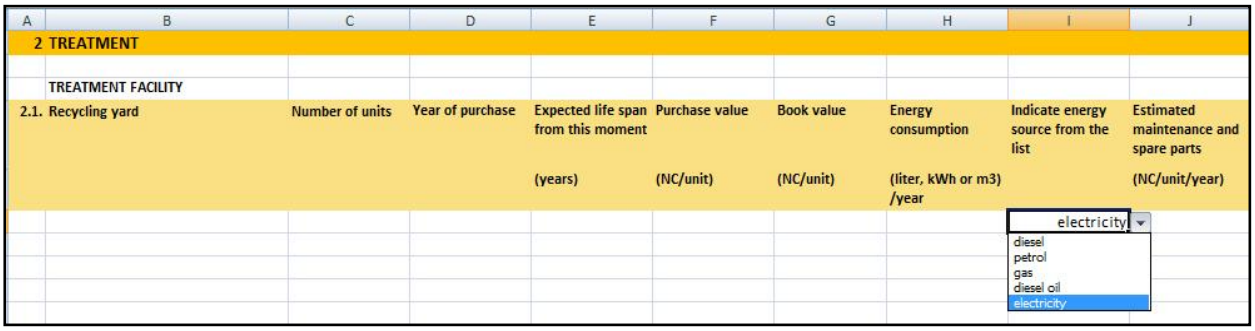


Transfer Stations - Figure 16

Example of Transfer station list: Stationary compactor, Replaceable container 35m^3, etc.

Section 2 "Treatment"

Section 2 "Treatment" is reserved for waste treatment inventory and consists of subsections on recycling yard, sorting, composting and mechanical biological treatment. Subsection 2.1 (Figure 17) is dedicated to recycling yards and by following the columns users should enter the name of the item or group of items, number of units, year of purchase or construction, expected remaining life cycle of unit and purchase and book value. The same logic follows when entering data on energy consumption and maintenance as it was explained for transfer stations.



Recycling Yards - Figure 17

Example of Recycling yard list: Container 5m^3, Shredder, Baler, Crusher, Forklift, etc.

Next treatment facilities for which information are asked is the activity of sorting. The same approach applies as for recycling yards. Start with title and number of units and proceed through the rest of the columns as shown in Figure 18.

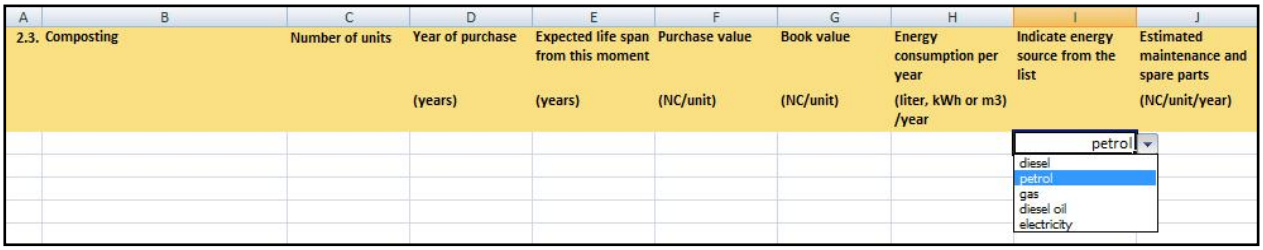
Note:
If sorting is part of another treatment facility like mechanical biological treatment you should enter data on sorting here, not in subsection devoted to MBT.

Sorting - Figure 18

Example of Sorting list: Sorting belt, Container 5m^3, Forklift, etc.

Continue with composting, first list composting facilities then enter the year of installation, remaining life span, purchase and book value, energy consumption and maintenance and spare parts. Data on energy consumption is entered as before, see Figure 19.

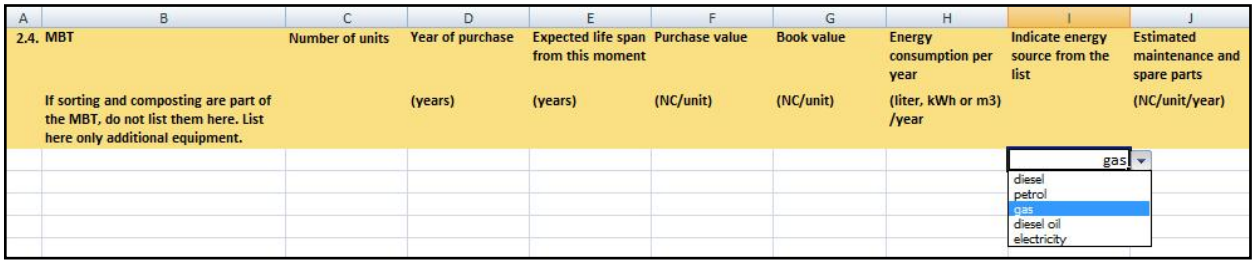
Note:
If composting is part of other treatment facility like mechanical biological treatment you should enter information about composting here not in subsection devoted to MBT.



Composting - Figure 19

Example of Composting list: Windrow composting equipment, Composter, Bulldozer, etc.

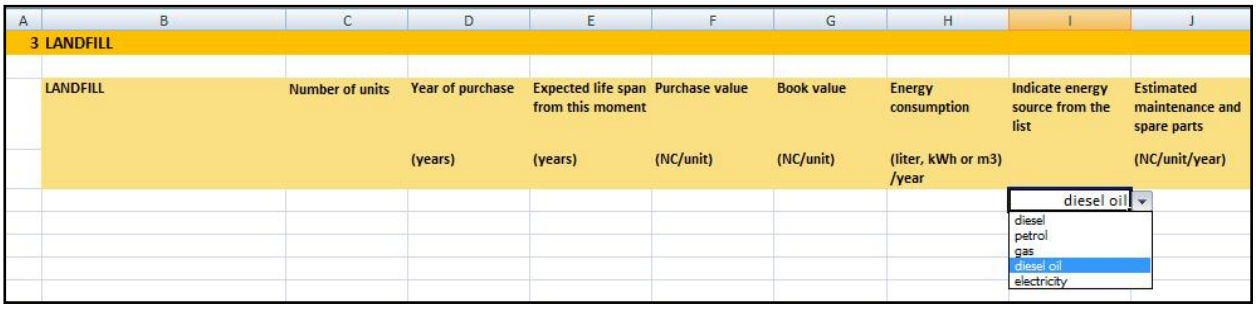
Continue with inventory related to mechanical biological treatment (MBT). As noted before in this subsection only input data that is additional to those entered earlier as separate treatment processes. Logic of inventory entry is the same as for previous facilities. Start by entering number of units, and then proceed with year of installation, remaining life span of the facility, purchase and book value, energy consumption (depending on energy source chose liters for diesel, petrol and diesel oil, cubic meters for gas and kilowatt hours for electricity) and maintenance and spare parts. Subsection on MBT is shown in Figure 20.



Mechanical Biological Treatment - Figure 20

Example of MBT list: Shredder, Industrial magnet, Conveyor belt, Biodigestor, etc.

In the following section data on Landfill is entered. Enter the name of the landfill, number of units, year of the construction, expected remaining life cycle of the landfill, investment value, and book value in national currency, energy consumption and maintenance. See Figure 21.



Landfill - Figure 21

Example of Landfill list: Scale, Compactor Truck, Bulldozer, etc.

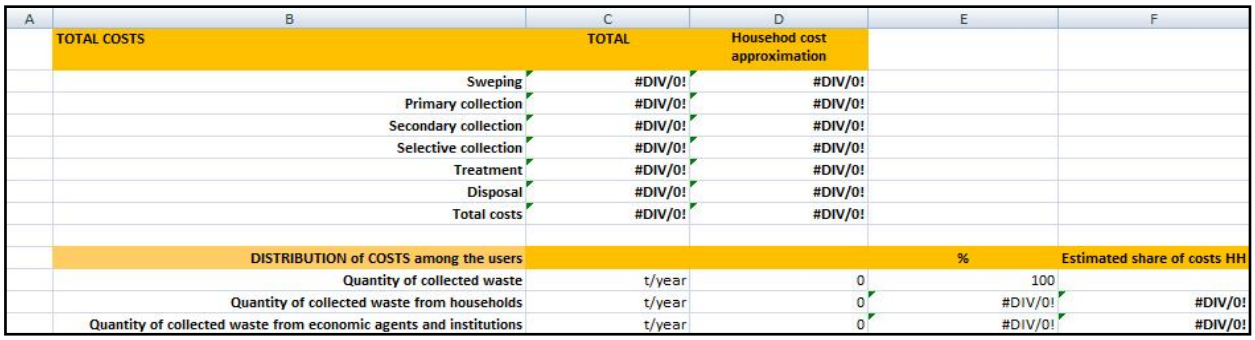
3.3. Calculation (Worksheet 3)

In the Worksheet 3 the total costs of operation are shown at the top and costs brakedown is shown in the blocks below. This sheet combines all entered data in the two previous input sheets and calculates costs according to the formulas activated in different cells. This sheet can not be edited while its main purpose is to calculate costs in order to provide basis for calculation of indicators on the Worksheet 4.

Users do not need to learn how the Worksheet 3 works and what are the calculating elements but for those users who would like to be more informed about it here follows a short overview of the sections.

Notes:
Assumption in the calculative part of the model is that only the vehicles are insured.
Once the Model is filled with data the sign "#DIV/0!" disappears and a calculated value is shown.

As shown in Figure 22, the worksheet starts with total costs and its distribution between Waste Management blocks and different service users such as households and other economic agents and institutions.



Total Costs - Figure 22

Going down the worksheet direct and indirect labor costs are given per Waste Management blocks i.e. per activity so you can see how much of labor costs go to sweeping, primary, secondary and separate collection, treatment of waste and finally disposal. In column D you can find share of labor costs per different activity. In column E you can see the share of labor costs within collection and finally in column

F there is percentage distribution of labor costs between treatment and landfill. See Figure 23. This is important since distribution of other costs per activity will be done according to share of labor costs.

A	B	C	D	E	F	G
	TOTAL LABOR COST	**#DIV/0!**	Weight	Weights for collection	Weights for tretment and disposal	
	Total direct labor cost	**0**				
	direct labor in sweeping	0	#DIV/0!			
	direct labor in primary collection	0	#DIV/0!	#DIV/0!		
	direct labor in secondary collection	0	#DIV/0!	#DIV/0!		
	direct labor in selective collection	0	#DIV/0!	#DIV/0!		
	direct labor in treatment	0	#DIV/0!		0	
	direct labor in landfilling	0	#DIV/0!		0	
	Total indirect labor	**#DIV/0!**				
	indirect labor in sweeping	#DIV/0!				
	indirect labor in primary collection	#DIV/0!				
	indirect labor in secondary collection	#DIV/0!				
	indirect labor in selective collection	#DIV/0!				
	indirect labor in treatment	#DIV/0!				
	indirect labor in landfilling	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!

Total Labor Costs - Figure 23

As shown in Figure 24, breakdown of costs continues with distribution of overheads between sweeping, primary, secondary and separate collection, treatment and landfill. Overheads include fuel and utilities, other costs related to operations, office overheads, third party services, taxation and financial costs.

Note: Indirect labor costs are redistributed directly proportionally to the share of direct labor cost.

B	C	D	E	F	G	H	I
REDISTRIBUTION OF OVERHEADS							
		SWEEPING	**PRIMARY COLLECTION**	**SECONDARY COLLECTION**	**SELECTIVE COLLECTION**	**TREATMENT**	**LANDFILL**
FUEL AND UTILITIES							
Total cost of fuel for vehicles (diesel and gas for fleet and for small cars patrolling)		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Cost of electricity		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Cost of water		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Cost of heating fuel		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Cost of wood		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
OTHER COSTs RELATED TO OPERATION							
Environmental Permiting and Monitoring costs for Landfill							0
License fee for Collection activities			#DIV/0!	#DIV/0!	#DIV/0!		
Building environmental rehabilitation fund							0
Other (specify):							

Redistribution of Overheads - Figure 24

This section ends with the display of total indirect costs redistribution, see Figure 25.

TAXATION COSTS							
VAT		0	0	0	0	0	0
Revenue related tax		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0
Property tax		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0
0		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0
0		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0
0		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0
FINANCIAL COSTS							
Interest		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0
Other (specify):		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0
0		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0
TOTAL INDIRECT COSTS REDISTRIBUTED		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Total Indirect Costs Redistribution - Figure 25

Finally in this part of "Calculations" worksheet as shown in Figure 26, distribution of buildings depreciation between different operations is given. Data on buildings are retrieved form "Inventory" worksheet and broken down according to distribution of labor costs. Total buildings depreciation per operation is given in line 106.

BUILDINGS DEPRECIATION	Linear Depreciation	SWEEPING	PRIMARY COLLECTION	SECONDARY COLLECTION	SELECTIVE COLLECTION	TREATMENT	LANDFILL
0							
0	0						0
0							
0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0	0		#DIV/0!	#DIV/0!	#DIV/0!		
0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0	0			0			
0	0					0	
0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Buildings Depreciation - Figure 26

Worksheet 3 continues with calculation of costs for different Waste Management blocks starting with Collection and Transport (Section 1). This section is divided between subsections 1.1 Sweeping, 1.2 Collection, 1.3 Transfer Station and Transport and 1.4 Selective Collection. Each of them is presented with part on staff expenses, costs of fuel, maintenance, insurance and depreciation and part about equipment.

Costs of sweeping are calculated as sum of labor costs and costs of fuel, maintenance, insurance and depreciation related to sweeping based on data inputted in previous two worksheets. See Figure 27.

A	B	C	D	E	F	G	H	I
1	COLLECTION AND TRANSPORT - C&T							
1.1.	SWEEPING							
1.1.1.	Staff	Full time employee equivalent	Average full salary cost per month per	Full cost per year				
	Direct labor cost							
	Manual street sweepers	0,00	0,00	0,00				
	Waste collector at truck	0,00	0,00	0,00				
	Drivers (including trucks, sweeping equipment)	0,00	0,00	0,00				
	Supervisor	0,00	0,00	0,00				
	Other (specify):	0,00	0,00	0,00				
	Street sweeper	0,00	0,00	0,00				
	Repair shop mechanic	0,00	0,00	0,00				
	Supervisor of sweeping	0,00	0,00	0,00				
	TOTAL direct labor cost			0				
	Indirect labor cost							
	weight of sweeping in total direct labor			#DIV/0!				
	Redistributed management cost			#DIV/0!				
	Redistributed administrative labor cost			#DIV/0!				
	Redistributed maintenance			#DIV/0!				
	Redistributed other			#DIV/0!				
	0			#DIV/0!				
	0			#DIV/0!				
	0			#DIV/0!				
	Total indirect labor cost			#DIV/0!				
	Total labor cost			#DIV/0!				
1.1.2.	Cost of fuel, maintainance, insurance, depreciation	Cost of fuel for vehicles	Maintenance of vehicles per year	Vehicles technical review and insurance per year	Salvage value	Accelarated	Linear Depreciation	Unit price of fuel
	0	0,00	0,00	0,00	0,00	0,00	0,00	FALSE
	0	0,00	0,00	0,00	0,00	0,00	0,00	FALSE

Collection and Transport, Sweeping - Figure 27

Subsection 1.2. on collection applies same logic. It presents total of costs for collection aggregating labor and fuel, maintenance, insurance, depreciation costs. See Figure 28.

A	B	C	D	E	F	G	H	I
1.2.	COLLECTION							
1.2.1.	Staff	Full time employee equivalent	Average full salary cost per month per	Full cost per year				
	Direct labor cost							
	Manual street sweepers	0,00	0,00	0,00				
	Waste collector at truck	0,00	0,00	0,00				
	Drivers (including trucks, sweeping equipment)	0,00	0,00	0,00				
	Supervisor	0,00	0,00	0,00				
	Other (specify):	0,00	0,00	0,00				
	Street sweeper	0,00	0,00	0,00				
	Repair shop mechanic	0,00	0,00	0,00				
	Supervisor of sweeping	0,00	0,00	0,00				
	TOTAL direct labor cost:			0				
	Management and aministrative labor cost							
	weight of collection in total direct labor			#DIV/0!				
	Redistributed management cost			#DIV/0!				
	Redistributed administrative labor cost			#DIV/0!				
	Total indirect labor cost:			#DIV/0!				
	Total labor cost:			#DIV/0!				
1.2.2.	Cost of fuel, maintainance, insurance, depreciation	Cost of fuel for vehicles	Maintenance of vehicles per year	Vehicles technical review and insurance per year	Salvage value	Accelarated	Linear Depreciation	Unit price of fuel
	0	0,00	0,00	0,00	0,00	0,00	0,00	FALSE
	0	0,00	0,00	0,00	0,00	0,00	0,00	FALSE

Collection and Transport, Collection - Figure 28

When it comes to costs related to vehicle the Model takes data from two input sheets and calculates sums regarding the costs of fuel consumed per vehicle, maintenance and technical review costs per vehicle per year, salvage value at the present moment and depreciation. Total of sums for all mentioned columns give Cost of fuel, maintenance, insurance, depreciation which is part of total cost of specific operation.

A	B	C	D	E	F	G	H	I
1.3.	TRANSFER STATION and TRANSPORT							
1.3.1.	Staff	Full time employee equivalent	Average full salary cost per month per	Full cost per year				
	Direct labor cost							
	Manual street sweepers	0,00	0,00	0,00				
	Waste collector at truck	0,00	0,00	0,00				
	Drivers (including trucks, sweeping equipment)	0,00	0,00	0,00				
	Supervisor	0,00	0,00	0,00				
	Other (specify):	0,00	0,00	0,00				
	Street sweeper	0,00	0,00	0,00				
	Repair shop mechanic	0,00	0,00	0,00				
	Supervisor of sweeping	0,00	0,00	0,00				
	TOTAL direct labor cost:			0				
	Management and aministrative labor cost							
	weight of transfer in total direct labor			#DIV/0!				
	Redistributed management cost			#DIV/0!				
	Redistributed administrative labor cost			#DIV/0!				
	Redistributed maintenance			#DIV/0!				
	Redistributed other			#DIV/0!				
				#DIV/0!				
				#DIV/0!				
				#DIV/0!				
	Total indirect labor cost:			#DIV/0!				
	Total labor cost:			#DIV/0!				
1.3.2.	Cost of fuel, maintainance, insurance, depreciation	Cost of fuel for vehicles	Maintenance of vehicles per year	Vehicles technical review and insurance per year	Salvage value	Accelarated	Linear Depreciation	Unit price of fuel
0	0	0,00	0,00	0,00	0,00	0,00	0,00	FALSE
0	0	0,00	0,00	0,00	0,00	0,00	0,00	FALSE

Collection and Transport, Transfer Station and Transport - Figure 29

Similar as for vehicles costs of equipment like containers and bins contain expenses for maintenance and spare parts, replacement costs, salvage value and depreciation. Total goes into overall cost of particular operation.

1.4. SELECTIVE collection								
1.4.1. Staff	Full time employee equivalent	Average full salary cost per month per	Full cost per year					
Direct labor cost								
Manual street sweepers	0	0	0,00					
Waste collector at truck	0	0	0,00					
Drivers (including trucks, sweeping equipment)	0	0	0,00					
Supervisor	0	0	0,00					
Other (specify):	0	0	0,00					
Street sweeper	0	0	0,00					
Repair shop mechanic	0	0	0,00					
Supervisor of sweeping	0	0	0,00					
TOTAL direct labor cost:			0					
Management and aministrative labor cost								
weight of selective collection in total direct labor			*#DIV/0!*					
Redistributed management cost			#DIV/0!					
Redistributed administrative labor cost			#DIV/0!					
Redistributed maintenance			#DIV/0!					
Redistributed other			#DIV/0!					
			#DIV/0!					
			#DIV/0!					
			#DIV/0!					
Total indirect labor:			#DIV/0!					
Total labor cost in SELECTIVE COLLECTION:			#DIV/0!					
1.4.2. Cost of fuel, maintainance, insurance, depreciation	Cost of fuel for vehicles	Maintenance of vehicles per year	Vehicles technical review and insurance per year	Salvage value	Accelarated	Linear Depreciation	unit price of fuel	
0	0,00	0	0	0	0	0	FALSE	
0	0,00	0	0	0	0	0	FALSE	

Collection and Transport, Selective Collection - Figure 30

Going down the "Calculation" worksheet we move into the part about treatment which incorporates staff costs, costs of recycling yard, sorting, composting and mechanical and biological treatment. Staff costs as in previous cases consist of direct and indirect labor costs as shown in Figure 31. Other non-labor cost include expenses for fuel or energy, maintenance per year, salvage value of operation at present time and depreciation.

2 TREATMENT							
2.1. TREATMENT							
2.1.1. Staff	Full time employee equivalent	Average full salary cost per month per employee	Full cost per year				
Direct labor cost							
Operator at the recycling yard	0,00	0,00	0				
Operator at sorting plant	0,00	0,00	0				
Operator at MBT	0,00	0,00	0				
Supervisor	0,00	0,00	0				
Other (specify):	0,00	0,00	0				
0	0,00	0,00	0				
0	0,00	0,00	0				
0	0,00	0,00	0				
TOTAL direct labor cost:			0				
Management and aministrative labor cost							
weight of treatment in total direct labor			*#DIV/0!*				
Redistributed management cost			#DIV/0!				
Redistributed administrative labor cost			#DIV/0!				
Redistributed maintenance			#DIV/0!				
Redistributed other			#DIV/0!				
			#DIV/0!				
			#DIV/0!				
			#DIV/0!				
Total indirect labor:			#DIV/0!				
Total labor cost in TREATMENT:			#DIV/0!				
2.1.2. Recycling yard	Cost of fuel or energy for equipment operation per year	Maintenance per year	Salvage value		Accelarated	Linear Depreciation	Unit price of fuel/energy
0	0,00	0,00	0,00	NO		0	0
0	0,00	0,00	0,00	NO		0	FALSE

Treatment - Figure 31

Worksheet 3 ends with calculation of costs for final disposal of waste, seen in Figure 32. The logic of the Model is same here. It takes direct and indirect labor costs related to landfill and costs of landfill facility including fuel or energy, maintenance, salvage value and depreciation.

A	B	C	D	E	F	G	H
3	**LANDFILL**						
3.1.	**LANDFILL**						
3.1.1.	**Staff**	**Full time employee equivalent**	**Average full salary cost per month per**	**Full cost per year**			
	Direct labor cost						
	Unskilled labour engaged at landfill	0	0	**0**			
	Security personnel	0	0	**0**			
	Operator at landfill reception	0	0	**0**			
	Operator at landfill (bulldozer, compactor driver, equipment handling)	0	0	**0**			
	Supervisor	0	0	**0**			
	Other (specify):	0	0	**0**			
	0	0	0	**0**			
	0	0	0	**0**			
	0	0	0	**0**			
	TOTAL direct labor cost :			**0**			
	Management and aministrative labor cost						
	weight of landfilling in total direct labor			***#DIV/0!***			
	Redistributed management cost			#DIV/0!			
	Redistributed administrative labor cost			#DIV/0!			
	Redistributed maintenance			#DIV/0!			
	Redistributed other			#DIV/0!			
				#DIV/0!			
				#DIV/0!			
				#DIV/0!			
	Total indirect labor:			**#DIV/0!**			
	Total labor cost on LANDFILL:			**#DIV/0!**			
3.1.2.	**Landfill facility**	**Cost of fuel or energy for equipment operation per year**	**Maintenance per year**	**Salvage value**	**Accelarated**	**Linear Depreciation**	**Unit price of fuel/energy**
	0	0	0	0	NO	0	0
	0	0	0	0	NO	0	FALSE

Landfill - Figure 32

At the very end of worksheet “Calculations” a logical check is built to ensure that calculated and entered values of the same data type match. If that is not the case users should go back to data entry worksheets and check entered data.

Cross checks	Calculated	Input
Fuel in sweeping and collection	0,00	0
Depreciation equipment	0,00	0
Depreciation buildings and land improvements	0,00	0
Maintenance and spare parts	0,00	0

Cross Check Field - Figure 33

3.4. Indicators (Worksheet 4)

Indicator worksheet summarizes all the work from previous three sheets. It extracts the cost data and displays it in the form of four groups of indicators. All indicators are given in two formats: in national currency per year and in Euros per year.

Indicators are meant to show what is the true costs of waste management service and how these costs are distributed between specific waste management activityies.

A	B	C	D
	INDICATORS	NC/year	EUR/year
A	TOTAL COST	#DIV/0!	#DIV/0!
B	BREAKDOWN OF TOTAL COSTS PER ACTIVITY		
	Sweping	#DIV/0!	#DIV/0!
	Primary collection	#DIV/0!	#DIV/0!
	Secondary collection	#DIV/0!	#DIV/0!
	Selective collection	#DIV/0!	#DIV/0!
	Treatment	#DIV/0!	#DIV/0!
	Disposal	#DIV/0!	#DIV/0!
C	COST/ activity/ ton		
	Sweping	#DIV/0!	#DIV/0!
	Primary collection	#DIV/0!	#DIV/0!
	Secondary collection	#DIV/0!	#DIV/0!
	Selective collection	#DIV/0!	#DIV/0!
	Treatment	#DIV/0!	#DIV/0!
	Disposal	#DIV/0!	#DIV/0!
D	COST/ activity/ capita		
	Sweping	#DIV/0!	#DIV/0!
	Primary collection	#DIV/0!	#DIV/0!
	Secondary collection	#DIV/0!	#DIV/0!
	Selective collection	#DIV/0!	#DIV/0!
	Treatment	#DIV/0!	#DIV/0!
	Disposal	#DIV/0!	#DIV/0!

Indicators – Figure 34

The first indicator is the Total cost (Indicator A). It shows the total cost of waste management service at the company per year. It comprises all costs of all waste management activity blocks which themselves incorporate different types of costs as described in “Calculation” worksheet. If the tariffs are set at the level of the overall waste management services including all services from primary collection until the final disposal of residual waste then this information combined with overall waste management related revenues can be used for adjustment of pricing policy.

Indicator B is showing the breakdown of Total costs per waste management activity blocks. This indicator can be used for setting tariffs for separate activities.

Indicators C and D show costs of specific waste management activity per ton and per capita showing the efficiency within single activity blocks.

4. Uses of indicators

Derived indicators can be used to perform two different types of comparisons. The first relate to the monitoring of trends within a single system or a waste management company in the intervals in which the data entry is done, in most cases this is one year. In this way it is possible to monitor trends at the overall system level or at the level of individual waste management activity blocks. A significant increase in the cost of a single block may indicate the occurrence of certain types of losses or inefficiencies. Also, increase in efficiency can point to positive trends that may result from certain business decisions or new policies.

The model may be used to investigate the feasibility of future investments and the impact they may have on operation costs, given that the user of the model knows the needed input data related to the investments.

On the other hand, comparison to different waste management systems is possible but can only be appropriate if it is done with companies that operate in similar conditions. It is a known fact that costs arising from the provision of waste management services will greatly depend on topography, geography, distribution of urban and rural settlements, state of road network, available technologies and facilities and finally on local economic conditions. However, an effort is needed to start demystifying the true costs of WM and make step towards benchmarking of accepted ranges of costs for different WM elements in the SEE region. That is the aim of the CFM Model.

5. Final Remarks

CFM represents a comprehensive tool adapted to the conditions in the solid waste management in South-East Europe. Using CFM can help employees in public utility companies and civil servants in local administrations in South-East Europe to understand better the “physical model” of the local waste management system and the real waste management cost structure.

Also, CFM could be an important tool for strategic decision and policy making when it comes to waste management. Analytical nature of the model and the classification of costs by place of origin and purpose gives the users the opportunity to plan and analyze different scenarios of service improvement. Also, to allocate the roots of problems in the system, measure them and give basis for proper decision making processes.

Finally, the Cost and Finance Model developed by NALAS is a unique tool which is also upgradable in terms of possible introduction of new sets of indicators and benchmarks.

6. List of Images

7. References

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