



Chapter 3

PREPARING A BUSINESS CASE



3. Preparing a Business Case

AWT projects need to be thoroughly prepared and analysed. Municipalities should define the role of the AWT in the waste management system as a whole, assessing options, hence ensuring that the final selection meets objectives and is feasible. After understanding the costs and revenues in the baseline, the cost of various AWT options need to be financially analysed. The required level of gate fee for the AWT project needs to be calculated, prior to undertaking final decisions.

3.1 Analysing Integrated Systems

An integrated 'system' approach is required when weighing the costs and benefits of AWT versus the BAU scenario. This implies taking into consideration the entire waste management system, identifying the changes in the flow of materials, what the implications are in terms of collection, pre-treatment and disposal, and what changes are needed to meet quality and quantity requirements for input materials for any AWT facility.

One simple approach is to draw a **process flow (or mass balance) diagram** for the waste streams to be handled. Process flow charts use arrows for collection and transport steps of waste management and a labelled box for every process where a material transformation happens. These changes, for example, can be in the form of changes to density, moisture, composition or the material quality. Using a process flow diagram will highlight the changes intended in terms of collection and pre-treatment.

Part of an integrated analysis includes the analysis of downstream markets and treatment needs for the residual waste following the various treatment options. The assumption of too optimistic market scenarios for outputs/by-products from AWT or not including cost estimates for treating residual waste can significantly change the financial analysis of a waste management scenario.

Figure 4: Presents an overview of the key waste sources, collection types, typical cost ranges and potential revenue sources for different types of AWT, when compared to the BAU situation of mixed MSW going straight to landfill. Figure 4: May be used as a reference guide to cross-check completeness when preparing a process flow diagram for a proposed AWT system.

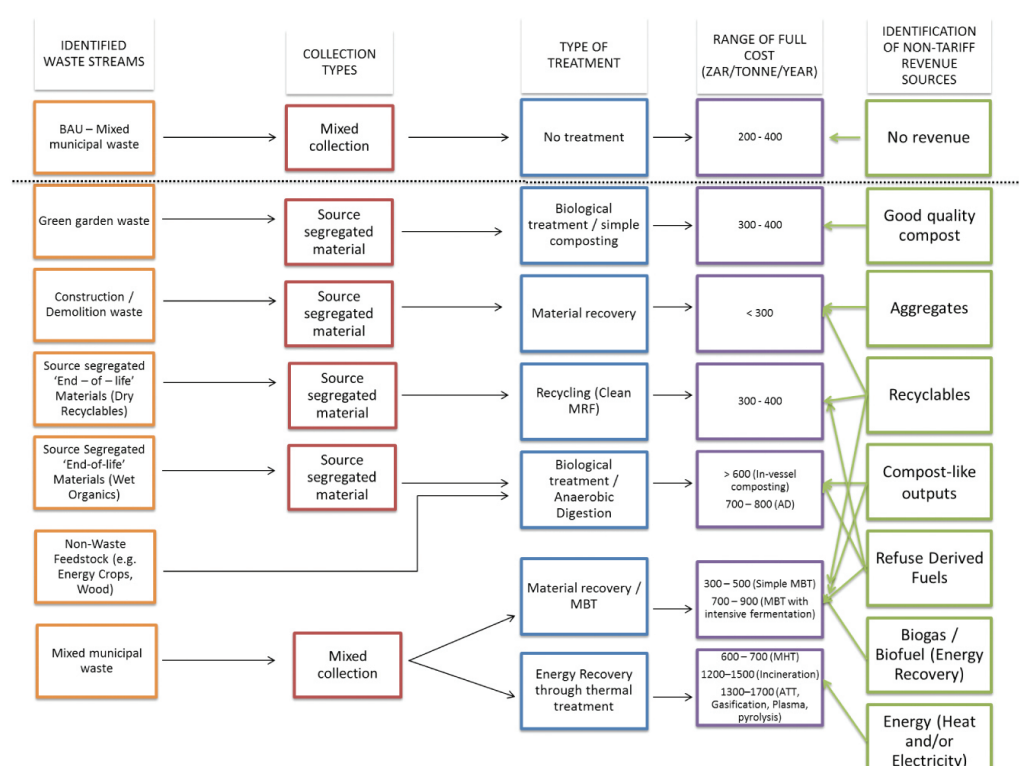


Figure 4: An illustration of AWT options, costs and non – tariff revenues per waste stream and collection types

⁷ Note: This is a simplified summary diagram and does not intend to be exhaustive in all technology configurations. The dotted line separates the BAU scenario from AWT technologies.

3.2 Defining Project Scope

Municipalities often receive unsolicited technology offers from different suppliers and sales agents. Unfortunately, in many cases these offers fail to deliver on promises when they are subjected to due diligence by independent experts. The offers are sometimes unreasonable and/or unfeasible and are often facsimiles from other projects. Consequently, not tailored to the specific needs of a municipality or regional waste management system.

Municipalities need to be cautious when entering into any agreements unless they have a sound understanding of how a particular AWT project will function within the overall waste management system. Key issues to consider in scoping AWT projects include a range of factors; the most important ones are discussed as follows:

- Process flow and material balance in the existing system
- Demand for secondary raw materials or energy
- Economies of scale and availability of feedstock
- Source and availability of capital investment
- Social, environmental and resource efficiency benefits

3.2.1 Process flow and material balance in the existing system

Understanding waste quantities and composition, existing material flows and facilities, and current costs and tariff/price structures is necessary. It is imperative to have a good understanding of the needs of the integrated waste management plan (IWMP) for the municipality.

3.2.2 Demand for secondary raw materials or energy

Assessing markets for the outputs of an AWT process is essential when defining the scope of work to be undertaken. For example, if there is a local demand for very high quality organically certified compost, then the compost derived from mixed municipal waste will not satisfy that market as it will be too contaminated. Similarly, if there is an energy output from a particular AWT process, the feasibility will depend on whether that energy can be utilised in the form of heat or electricity. If the energy can be utilised in the form of heat, the proximity of the customers to the AWT facility needs to be taken into account.

Market considerations have a significant impact on the feasibility of different types of AWT, and the reliability of project cost-benefit estimations.

3.2.3 Economies of scale and availability of feedstock

Economy of scale is a key aspect for analysis. Certain facilities are flexible and may be cost-effective at smaller scales, whilst others only become viable at a larger scale.

If a large facility is planned, this may require regionalisation, which implies that municipalities will need to be prepared to work together in the planning, financing and implementation of such projects. Regionalisation is an option to consider for achieving better economies of scale and reaching feasible input quantities for AWT facilities, but it is not always easy to achieve.

3.2.4 Source and availability of capital investment

Due to the limited potential to publicly finance AWT, attracting private investment is often a key criterion in defining the scope of an AWT project.

3.2.5 Social, environmental and resource efficiency benefits

Other key criteria to consider are job creation and livelihood protection/creation. The environmental and resource recovery benefits of the treatment options also need to be estimated.

National policy goals and local governance objectives converge in the four points, listed earlier and, tend to be the main decision-making factors that surround approval of AWT projects.

3.3 Understanding Existing Costs

To gain an understanding of the existing costs, municipalities need to identify the full costs of waste management services. This is not an easy task when the waste management service related costs have not been 'ring fenced', or at least recorded in a 'cost centre', i.e. a separate inventory of costs and revenues attributable to waste management services.

Understanding the full costs of waste management services involves preparing an asset register, collecting and assimilating data on operating costs (both budgeted and actual), and identifying other 'hidden' costs and revenues. **Full cost accounting, activity-based accounting and revenue sources are discussed at length in the *Solid Waste Tariff Setting Guidelines for Local Authorities*⁸.**

The collection of data and subsequent analysis of the 'status quo' should ensure that the existing assets are fully considered. A detailed understanding of the cost components helps to make future cost projections as accurate as possible.

Municipalities and operators regularly maintain an inventory of assets, along with their book value and an estimated remaining useful life. Additional data collection may be required to understand the technical characteristics of the assets, i.e. fuel consumption of vehicles, maintenance needs and availability of spare parts.

In general, the inventories include all fixed and capital assets, such as land, construction, offices and industrial buildings, storage yards, garages, vehicles, waste treatment installations and waste handling equipment.

Major budget line items include waste disposal, collection, cleaning services and remediation/closure of existing landfills/dumpsites. Added to this, is the investment budget allocated for replacement of equipment and/or upgrades.

The cost information as illustrated in Table 2, serves as an example of the type of costs associated with different components of the waste management service.

It should be noted that the costs do not include the cleaning of illegal dumpsites. According to the City of Cape Town (personal communication), the cost for cleaning up illegal dumpsites is one of the city's largest budget items, which in 2015 was estimated at 400 million ZAR/year.

Table 2: Operational costs budget for Johannesburg (2012/2013), Cape Town (2009/2010) and Rustenburg (2012/2013) municipalities⁹

Operation costs	Unit	Johannesburg (2012/2013) ¹⁰	Cape Town (2009/2010) ¹¹	RLM (2012/2013) ¹²
Waste generation	Tonnes	1,775,600	3,030,412	91,793 ⁶
Operational budget	ZAR	1.3 bn	1.5 bn	0.1 bn
Operation costs as a percentage of budget				
Collection	%	35	40	35
Area cleaning	%	14	31	23
Disposal	%	8	18	16
Administrative	%	1	7	12
Drop offs	%		4	
Overheads	%	21		2
Other cost	%	21		13
Total	%	100	100	100

⁸ Republic of South Africa, Department of Environmental Affairs, 'Solid Waste Tariff Setting Guidelines for Local Authorities', May 2012

⁹ The information was sourced from the City of Cape Town Metropolitan Municipality and from Pikitup (Johannesburg's official waste management company), Johannesburg. Given the different timeframes, these costs should be seen as general guideline values and are not directly comparable.

¹⁰ De Wit Sustainable Options, Sally Anne Käsner Jeffares & Green, 'Pikitup Waste Minimization Startup Info', Annexure A, September 2013

¹¹ Akhile Consortium, 'MSA Section 78(3) to Assess Alternative Service Delivery Options', RFP No. 554C/2008/09, Consolidated Report, Solid Waste Management Department, Cape Town Municipality, May 2011

¹² Rustenburg Local Municipality, Directorate – Technical and Infrastructure Services, Operating Budget 2012/2013

¹³ Infrastruktur&Umwelt, Professor Bohm und Partner, KfW, 'Draft Feasibility Study Report. Advanced Integrated Solid Waste Management System for Rustenburg Local Municipality', February 2009, pp 17.

The examples of budget breakdowns presented in Table 2 are from secondary information sources and are therefore different. Some cost categories such as those related to a municipality's role in planning and outsourcing waste management activities have not been elaborated upon further.

3.4 Specific Costs

The costs per tonne of collection services vary widely. These costs depend on the following:

- method of collection chosen (whether door-to-door, communal or block collection, etc.);
- distances within the collection area;
- types of vehicles and containers used;
- infrastructure of the city;
- types of waste collected; and
- types of housing and commercial/industrial premises.

Where the costs of disposal are reflected in the landfill gate fees, they can be easily understood and used as a benchmark against which to assess AWT alternatives. There are differences among fees depending on the type of waste delivered, for example, inert waste disposal in some landfills is at no cost to the generator, while waste generated outside of the municipal territory may be more expensive to dispose of.

Specific full cost of landfilling in Cape Town is estimated at 400 ZAR/tonne based on the 2009/2010 budget information and including capital expenditures; a large proportion of which were allocated for disposal and drop offs.¹⁴ The closure and after-care costs of the landfill and the cost of waste transfer are also included in the gate fee for the City of Cape Town. However, capital expenditures for land purchase and facility have not been included.

Experts estimate that the operating costs of landfills are currently in the range of 150 to 450 ZAR/tonne depending on the management practices and pricing policy at the site.¹⁵

Waste disposal gate fees are mostly designed to cover the operation costs, and at times may also include capital depreciation and interest costs. The average landfill gate fee, nationwide, is approximately 150 ZAR/tonne. Table 3 provides information on the disposal gate fees that are applicable for Cities of Johannesburg and Cape Town, respectively.

Table 3: Disposal gate fees for Johannesburg and Cape Town

Disposal gate fees	Johannesburg (2013/2014) ¹⁶ ZAR/tonne	Cape Town (2014/2015) ¹⁷ ZAR/tonne
For general waste excluding VAT	309	317
Rate of cost recovery of disposal cost from gate fee	No information	Estimated at 100% operational cost recovery rate

Sources of revenues for collection are user charges collected from citizens and commercial customers using the service. Payment rates vary. Low-income earning citizens have a right to receive the public service of waste collection free of charge.



¹⁴ Akhile Consortium, 'MSA Section 78(3) to Assess Alternative Service Delivery Options', RFP No. 554C/2008/09, Consolidated Report, Solid Waste Management Department, Cape Town Municipality, Executive Summary, page xxvi, May 2011,

¹⁵ Bertie Lourens, WastePlan, direct communication 5th of May 2015 and John Coetzee, Jeffares and Green, personal communication 9th of May 2015

¹⁶ De Wit Sustainable Options, Sally Anne Käsner Jeffares & Green, 'Pikitu Waste Minimization Startup Info', Annexure A, September 2013

¹⁷ Gate fee as declared by the City of Cape Town, valid until 30th of June 2015

3.5 Operational Costs

Accounting records and budgets maintain information about operating costs. Some difficulties may arise in discovering these costs as municipal waste budgets may not be clearly demarcated or 'ring fenced'. Furthermore, cost data may only be available to operators who might wish to keep this data confidential.

Costs of different utilities or service elements are often aggregated, recorded in different departments of the municipality. This situation fosters uncertainty in decision-making and sends incoherent signals to the private sector – thus creating a market barrier for the development of AWT.

A typical operating cost structure for waste management services includes direct labour, fuel, utilities, supplies and mechanical maintenance and repair costs. Operation costs include costs that are not always immediately obvious and may be hidden in other budget lines, or may be part of an overall overhead that is not attributed to waste management.

Examples of these costs include: Obtaining permits, planning for waste management, preparing tenders and contracting, management of operators and monitoring and quality control. Customer relations and satisfaction surveys, awareness-raising, insurance, taxes and cost of financing sometimes also fall within this category.

Costs related to *ad-hoc* activities, such as cleaning-up of illegal dumps or debris after a storm or flood, extinguishing landfill fires or closing old landfills sometimes also fall into the category of hidden costs.

It is good practice to calculate costs based on activity, separated for each individual component of the service – such as street sweeping, waste collection, waste transport, recycling and landfill operations.

3.6 Revenues

Revenues may comprise local taxes or fees, revenue from the sale of materials or energy recovered, gate fees, collection from service users/customers or transfers from local or national budgets. Other, less significant, financing sources include income from permits, the occasional renting of assets, profit sharing deals (e.g., concession fees) or littering fines. Where gate fees or user charges are applied, it is important to understand the current payment rates.

Once current costs and revenues are understood, the process of forecasting future revenues and expenditures may commence. Forecasts of future revenues are required to set user fees. *The Solid Waste Tariff Setting Guideline for Local Authorities*¹⁸ allows for different revenue collection mechanisms, including taxes, user charges or a combination of both. The Guideline presents options for introducing targeted subsidies as well as using tariff systems to incentivise source separation and waste minimisation.

The source of financing for the operating costs is also the starting point of analysis for future systems. Changes proposed in the revenue structures usually need to be gradually introduced in order to ensure social acceptance.

3.7 Financial Analysis

Financial analysis is a professional sphere of work and municipalities will require technical expertise to prepare and assess the financial, cash flow and subsidy implications of AWT projects. This section highlights some of the issues that need to be taken into account when financially analysing an AWT project.

Most AWT facilities will require a gate fee to be paid to the operator of the facility in order for the business case to be viable. This gate fee may need to be competitive with the cost of landfill, or the cost of landfill including the calculated environmental and social benefits and externalities. In some cases, an AWT facility may be viable as long as input materials (e.g. green waste or construction and demolition waste) are delivered free of charge to the AWT operator. However, each case is different and needs to be assessed on its merits.

Technology offers for an AWT facility being received from manufacturers, suppliers or sales representatives should be *independently verified* as to their suitability for the applicable situation.

¹⁸ Republic of South Africa, Department of Environmental Affairs, 'Solid Waste Tariff Setting Guidelines for Local Authorities', May 2012

3.7.1 Defining key input values to the analysis

The lifetime of the investments and the period for financial analysis need to be defined. The period of analysis is usually 20-30 years or the lifetime of the major asset (e.g. landfill or treatment facility).

The financial analysis uses a set of macro-input indicators and forecasts for key variables. These include forecasts for population growth, waste quantities and composition, interest rates, fuel costs, energy prices, compost prices, refuse-derived fuel (RDF) prices, etc. The financial analysis should usually be carried out in constant (real) prices.

Input data and forecasting needs careful consideration, since slight variations may alter the projected financial outcome. Sensitivity analysis that poses 'what if?' scenarios for waste input rates, costs and revenues is essential to rectify these effects and provides a sound basis for decision-making.

Several of the input indicators are difficult to determine, but the greatest ambiguity usually surrounds the waste quantities and composition. Allocating the budget and taking the time to carry out waste quantity and composition surveys is essential prior to undertaking major AWT investments, especially for those AWT projects that rely on waste input being of a certain calorific (heat) value.

3.7.2 Assessing full cost of treatment options

Future costs need to be estimated with a reasonable degree of confidence.

Capital and investment costs need to be fully considered, and include all costs related to planning, permitting, siting, and construction of the facility. These costs will need to be factored into cash flow calculations as cost of financing (i.e. interest and debt repayment).

Investment costs can include land purchase, site clearance, construction of reception areas and buildings, materials storage areas, mobile plant and vehicles, containers and vessels, mechanical equipment, electrical equipment, pollution control equipment, etc.

For a thorough assessment, the financial outcomes of the project need to be analysed over the lifetime of the investment. The analysis of the BAU scenario should not be limited to the current status and should rather include any changes to the baseline that may be envisaged over time.

It should be borne in mind that most, if not all, AWT facilities have process rejects or by-products that will require landfilling. In some cases, these materials may be hazardous in nature. In all cases, the costs of landfilling these items need to be included in the financial analysis of an AWT project.

3.7.3 Affordability and cost recovery

The challenge of keeping waste management systems affordable and also covering costs is a pressing decision-making issue. Authorities are responsible for ensuring a reliable, quality service that is fully compliant with legal requirements, whilst also ensuring that the costs of, and tariffs for, the services are kept within affordability ranges for the population.

In 2011, the *National Policy for the Provision of Basic Refuse Removal Services to Indigent Households*¹⁹ was tabled, in line with the *Free Basic Services Policy* adopted in 2001.²⁰ It aims to provide a basket of free basic services to citizens, including solid waste collection, water, sanitation and electricity.

Under these circumstances, it becomes clear that **achieving full cost recovery** for more advanced treatment options will be challenging. Currently, waste tariffs in many municipalities barely cover collection costs, and do not include costs of disposal.

¹⁹ Republic of South Africa, Department of Environmental Affairs, 'National Policy for the Provision of Basic Refuse Removal Services to Indigent Households', 2011

²⁰ Republic of South Africa, 'Free Basic Services Policy', Pretoria: Government Printer, 2001

The gate fee or the specific subsidy required will be the single most important indicator for deciding whether or not to invest in a certain technology. For municipal solid waste, regardless of who the operator of the plant is (i.e. whether private or public), a gate fee will need to be paid for every tonne handled.

The information gathering, analysis and interpretation for preparing a business case for the introduction of AWT takes some time. Some of these steps may already be part of the daily financial and operations management of the municipality and information may be readily available regarding the current process flow and financial situation assessment.

The involvement of experts knowledgeable in the different AWT technologies is important in the financial analysis. Expectations and assessment of market demand and policy environment should be well understood. The effort to go through the steps diligently will pay off in decisions that are sustainable and beneficial to the community in the long-term.

3.8 Concluding Remarks

Preparing the business case for investing in AWT has two major parts. The first is the baseline assessment that includes understanding the current process flow, the waste quantities and composition and current costs. The second part includes the financial analysis of the different technical options considered. During the setting of tariffs the double constraint of affordability and cost-recovery requirements need to be considered. The end decision when opting for advanced waste treatment as compared to the business as usual scenario largely depends on whether the incremental change in the cost to the municipality is acceptable.

