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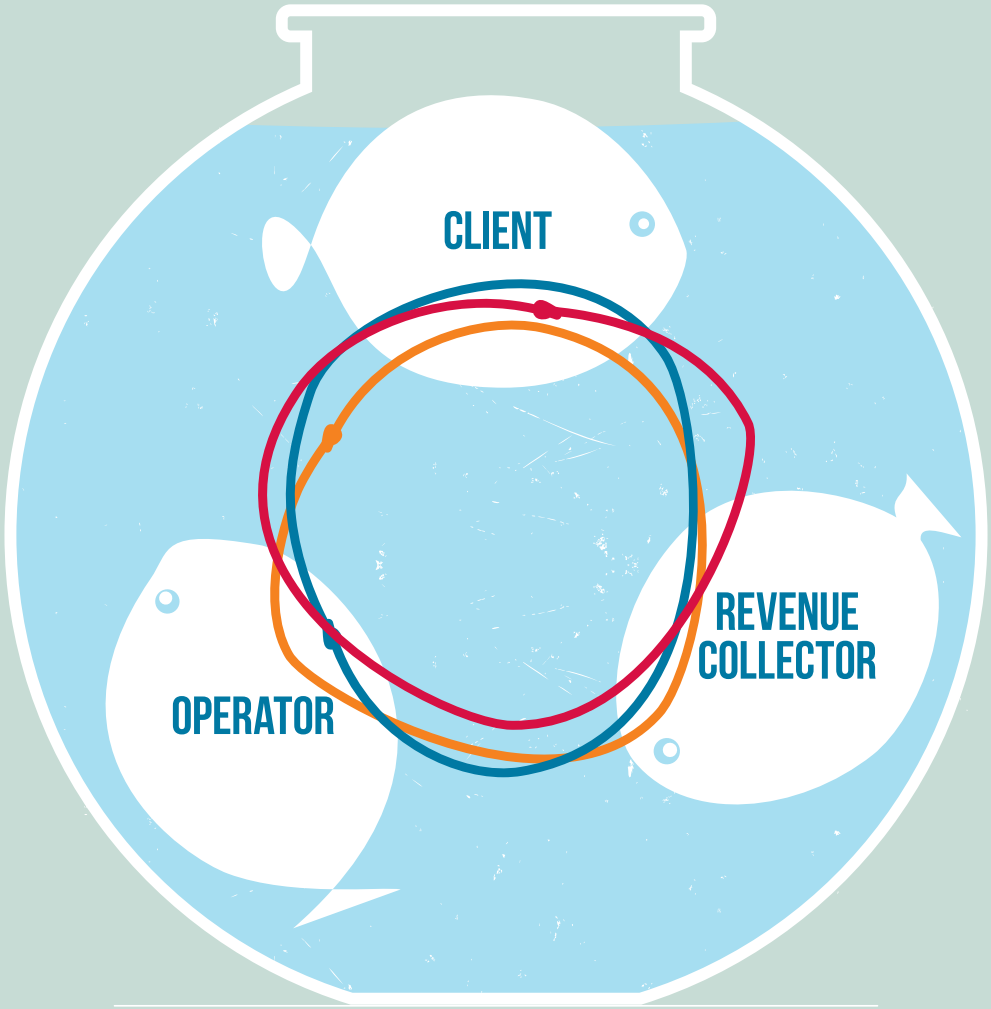

Operator Models. Respecting Diversity

Guidance Paper for Solid Waste Management Practitioners

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Acronyms

com	Common Operator Model
CBO	Community Based Organization
DBFO	Design-Build-Finance-Operate
DBO	Design-Build-Operate
DBOT	Design Build Operate Transfer
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IFI	International Financial Institutions
ISWM	Integrated Sustainable Waste Management
IWB	Itinerant Waste Buyer
MSP	Micro Service Provider
MSW	Municipal Solid Waste
NGO	Non-Governmental Organization
PSP	Private Sector Participation/Private Service Provider
RDF	Refuse Derived Fuel
SWM	Solid Waste Management
ToR	Terms of Reference

Definitions

Micro-service provider (MSP)

MSP is a collective term introduced to refer to all the micro-entrepreneurs engaged in primary collection and/or recycling and include Community Based Organizations (CBOs), Residents Associations, local NGOs and CBOs or informal sector service providers, such as informal collectors or itinerant waste buyers (IWB).

Operator Model

The location and inter-relationship between the client, operator and revenue collection functions in a solid waste management system.

Primary Waste Collection

The collection of waste from the point of generation (e.g. household or commercial premises) and transport to community container or other place of secondary collection.

Secondary Waste Collection

The collection of waste from a place of temporary storage that is distant from the point of generation (e.g. community container or other location) and transport to transfer station, treatment or landfill.

One-Step Collection

The collection of waste from the point of generation (e.g. household or commercial premises) with direct transport to transfer station, treatment or landfill.

Introduction

This Guidance Paper provides a methodology for identifying and selecting the integrated sustainable waste management (ISWM) operator models most suited to your local situation.

The aim is to provide a methodology that can assist you make an informed decision about which operator models to try out, and to provide you a menu of options to chose from. The Guide provides a series of checklists to help you:

- Identify problems and framework conditions;
- Formulate and prioritize objectives;
- Assess conditions and capacities; and
- Select an appropriate model or combination of models.

Although some operator models seem to better fit the different types of SWM service delivery being practised around the world, it is equally true that any particular model may work well if managed well. In this Guide we offer management tips for bringing out the most of the SWM operator models in place.

In an Annex to the Guide we summarise the common operator models (coms) in use within ISWM systems worldwide, describe their advantages and drawbacks, and provide a handy tool for designing your ISWM system.

This Guidance Paper is a daughter publication to the sourcebook 'Operator Models: Respecting Diversity'. The Book should be read and used as a source text for this Guidance Paper. It is based on in-depth field research from 5 case studies and review of 23 further case studies from literature (see Figure 1).

Figure 1: Case study locations

1	Accra	**7**	**Castries**	13	Ghorahi	19	Moshi	25	Varna
2	Bahrain	**8**	**Cigres**	14	Kolkata	20	Nairobi	26	Yaounde
3	Bamako	9	Curepipe	15	Kunming	**21**	**Qena**		
4	Belo Horizonte	10	Dar es Salaam	16	Lusaka	22	Quenzon		
5	Bengaluru	11	Delhi	17	Managua	**23**	**Surat**		
6	Bishkek	12	Dhaka	**18**	**Maputo**	24	Tangier		

Who is this guide for?

The Guidance Paper is a decision making tool for public authorities, development agencies, and practitioners working for improving municipal solid waste management practices.

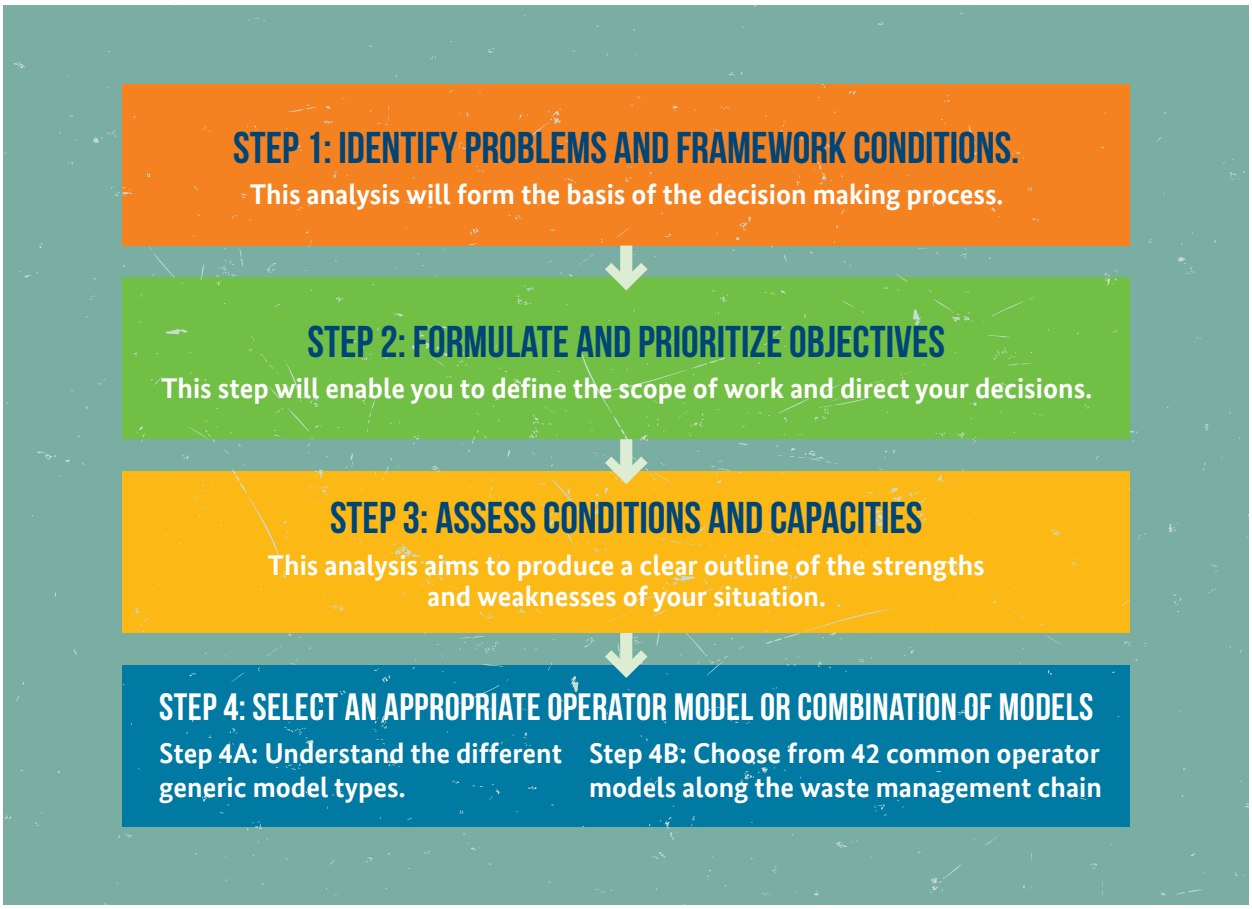
We encourage you to study your ISWM system carefully before making decisions, and to approach the task as a collaborative effort with other colleagues including specialists in the field.

Designing your ISWM system is a complex task, and whilst we have attempted to keep things as simple as possible in this Guide, it is advisable to have specialist help at some point in the ISWM Operator Models decision-making process.

What is the structure of the guide?

After defining what we mean by the term "operator model" in this introduction chapter, the Guide goes sequentially through 4 recommended steps for selecting an operator model.

Figure 2: Recommended steps for selecting an operator model



A closing chapter, "How to make the best of your operator model", summarizes key findings, and provides guidance on how to make the best of your operator model. This chapter gives a few management tips that represent universal good practice, and that when applied will improve the quality of your ISWM practices.

Annex A details and complements Step 4B by summarising the 42 common operator models that have been identified through the research, noting their advantages and drawbacks. The Annex introduces a coded classification system for the *coms* (from 1-42) that include all the various types of generic operator model category that have been identified form the cases, and form the authors' experience.

It should be noted that the *coms* identified are in some cases an umbrella category that actually contain different sub-models. For example, joint-venture PSP service arrangements will have a different *character* depending on the relative share ownership of the public and private partners. We have decided not to break things down into too much detail in this Guide, rather to keep things as simple as possible.

We hope that in the future, as this Guide is used and feedback received, that we will be able to refine and improve on the coms classification, and add more handy tools and materials to help you to implement you selected options.

How to use this guide

Whether a seasoned practitioner, or new to the profession, this Guide intends to help you in the process of identifying and selecting ISWM operator models that are tailored to your specific needs and requirements.

After reading the mother publication and sourcebook to this Guide, *'Operator Models: Respecting Diversity'*, you should be familiar with the wide range of different approaches to ISWM that are being used around the world, and have a good sense of the diversity of ways of going about organising your ISWM services.

Selecting and refining appropriate operator model is a dynamic and iterative process that requires detailed assessment and professional judgement.

Essentially, through this Guide, you can design your own ISWM system. You can identify and piece together the different building blocks that make up an ISWM system from the beginning to the end of the chain.

This process starts with understanding of the framework conditions and capacities. It is important that you commit time and effort to assess your situation thoroughly. Remember that every case is unique and thus an ISWM system must be developed to best fit the local situation, and hopefully evolve to remain the best fit over time.

You will need to assess the local conditions and capacities, evaluate the model options for their suitability, and repeat the steps until you are satisfied that you have reached a good outcome. Choose the model or models that best fit your conditions and capacities, and serve your objectives well.

If the ISWM operator models you identify are in fact the ones already in place, then you can use this Guide to help strengthen the existing ISWM practices.

Irrespective of whether you want to stick with your existing ISWM operator models, of make big changes, we recommend following each step identified in this guide sequentially.

What is an operator model?

We have derived the definition of the operator model from institutional theory on integrated and sustainable waste management (ISWM) that recognises 6 essential roles in waste management as illustrated in Figure 3 below.

Figure 3: Institutional roles in ISWM (Adapted from Wilson D.C., Whiteman A. and Tormin A., 2001)

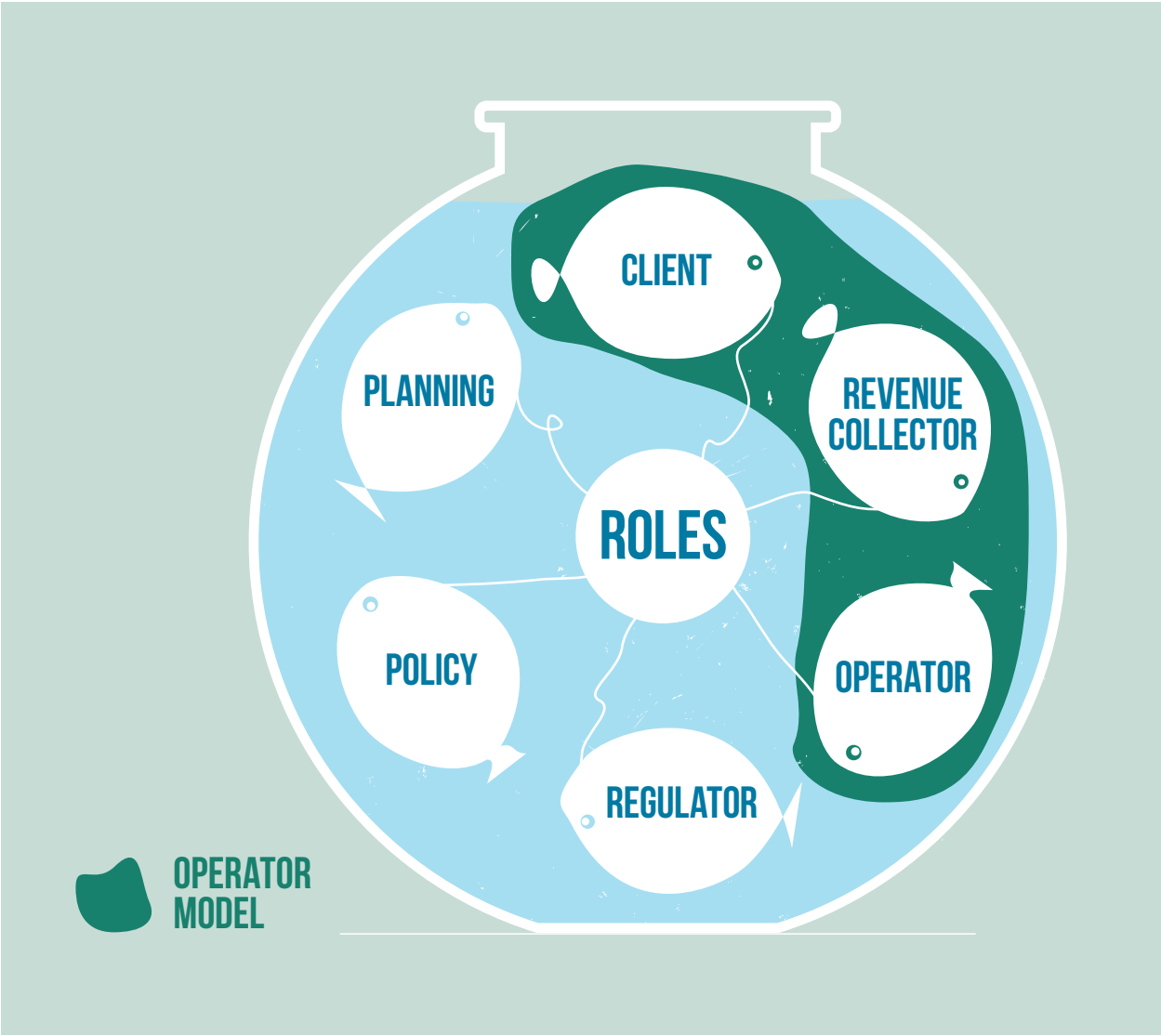
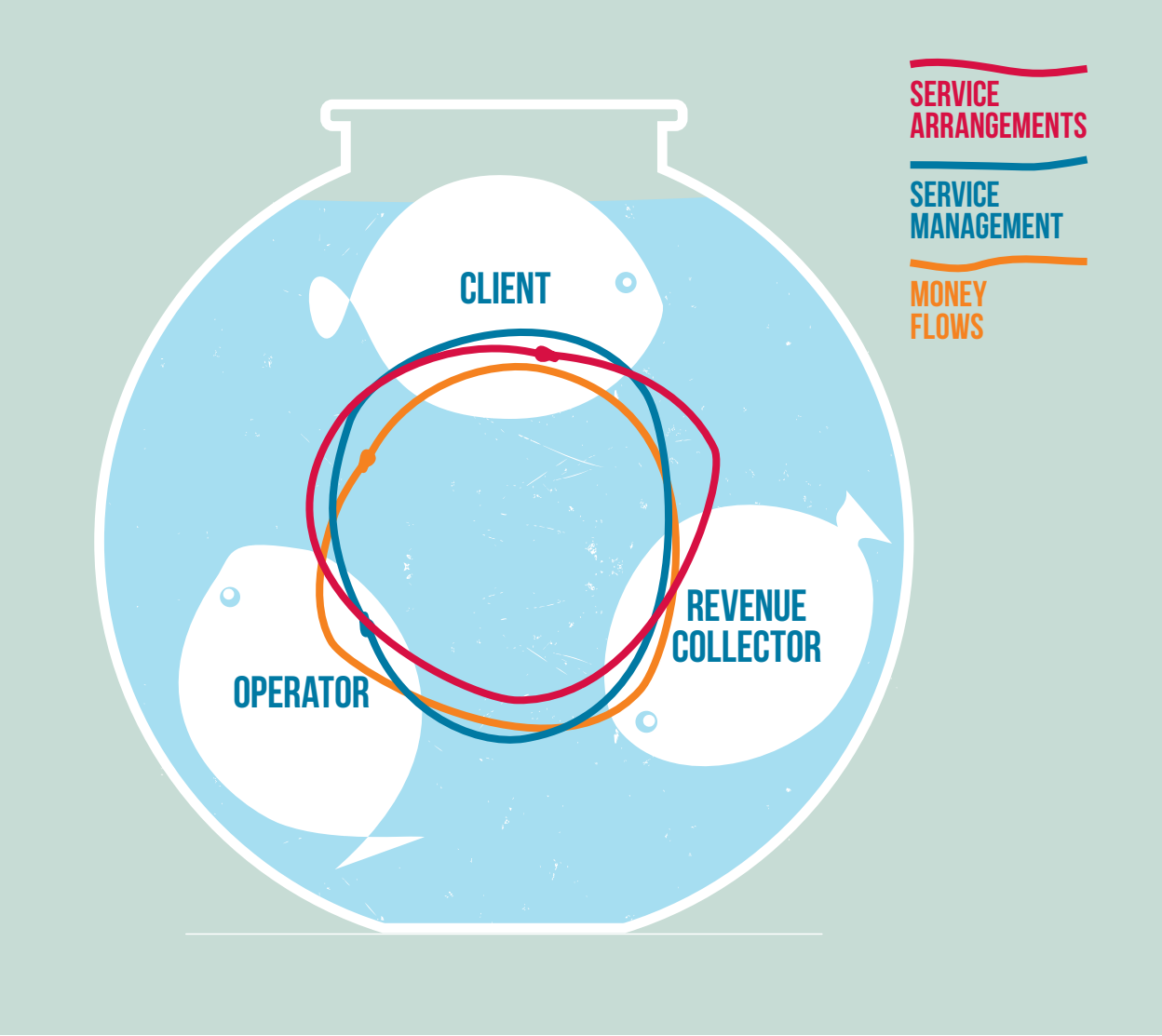


Figure 4: Components of an Operator Model



Of these functions, the planning, policy maker and regulator roles are a given, they are part of the framework in which services are delivered and thus are not really influenced through solid waste management planning. The location and inter-relationship between the client, operator and revenue collection roles define the "operator model" as illustrated in Figure 4.

These three roles are distinct in that they may be located in different institutions & organisations, or in different departments of the same organization, depending on the operator model.

For example, in a private sector participation model where the private sector is engaged as a service provider for collection, the private sector company is the *'operator'* (delivering the day-to-day services on the ground), the public authority is the *'client'* (responsible for ensuring the provision of a reliable waste management service) and the *'revenue collector'* (responsible for

organizing the money flow and collecting the finances to operate and sustain the service).

In a 100% public SWM operator model the municipality is the *'operator', 'client',* and *'revenue collector'* at the same time, but still all the functions need to be in place and carried out by specialized departments or personnel.

In private sector participation (PSP) arrangements, the day-to-day operations are contracted-out to non-state enterprises of different sizes and financial capacities. The client function almost always remains with the municipality, but the revenue collector function can either be delegated to the service provider, to a third party, or remain with the municipality.

In inter-municipal, regional or nationally organised models the client function is located at that respective institutional level whether being one or more municipalities or regional or national government.

With all these variables, one can easily imagine that there is a multitude of possible operator models, as many different types of client, operator and revenue collector arrangements can exist. Figures 5&6 give an idea of the diversity of clients and operators.

Figure 5: Continuum of governance levels in operator models

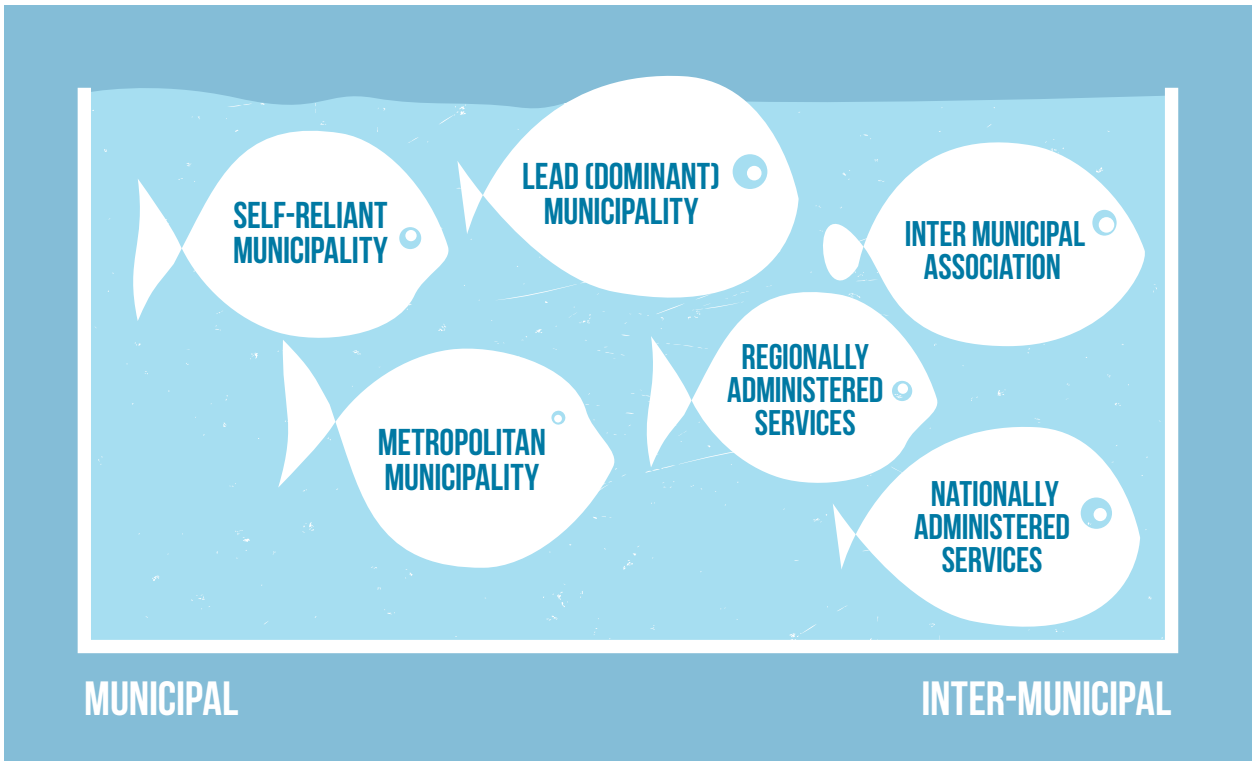
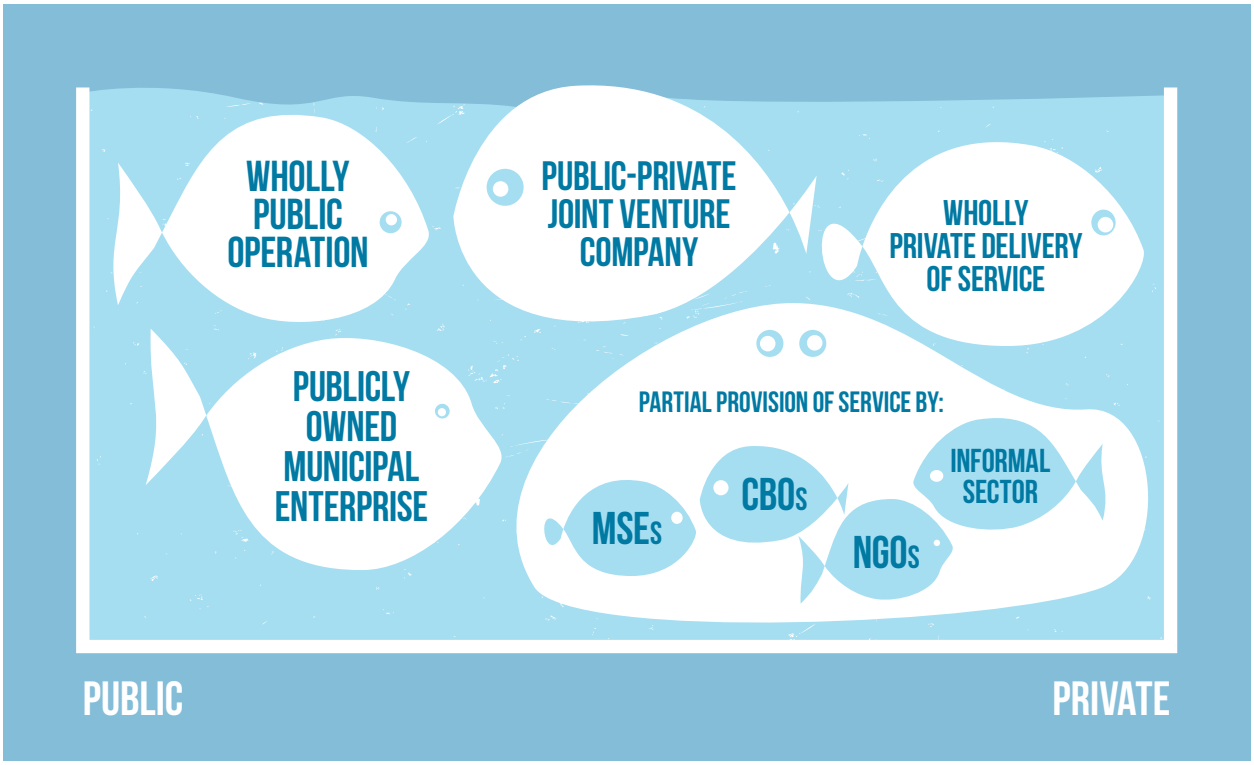


Figure 6: Continuum of public-private sector operator models



Once the location of the functions is established there are then a variety of ways to contract, organize, manage, finance and re-finance the service, opening up an even greater range of options.

As it is clear that a multitude of different ways to organize SWM services exist, it is advisable to begin by looking at each component in the chain of services (sweeping, collection, transport, treatment and disposal) individually. Once you have determined the most suitable way to organize each service you can think about linking the chain together either through capturing several components of the chain through the same model, or by linking several models together to create a holistic operator model that combines the best *com's* to meet your specific service needs.

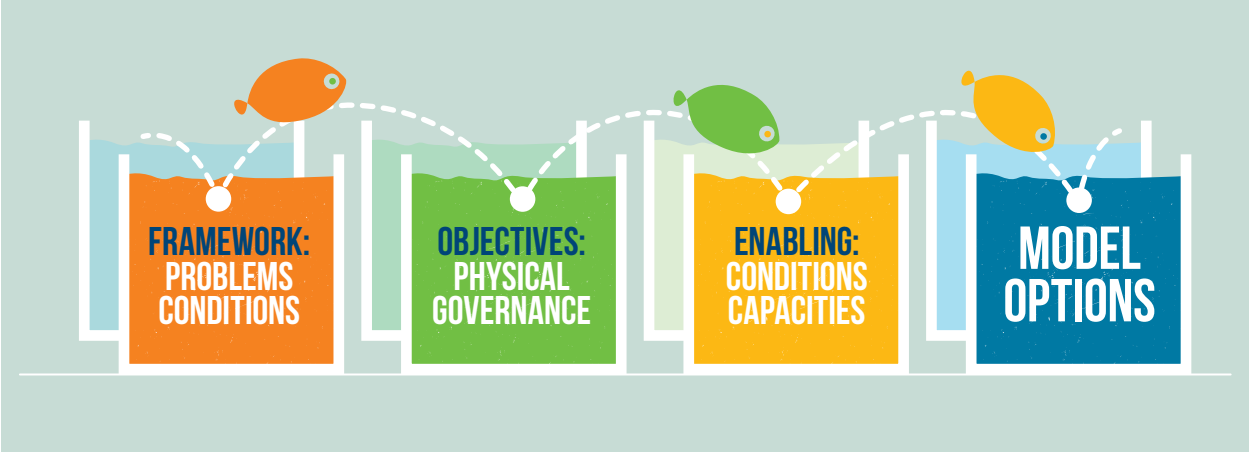
Each operator model is tailor-made to the specific situation it has to serve. Around the world, a wide variety of different options (or combinations of options) exist, making each ISWM system unique. In our work we promote recognition of the importance of understanding local objectives, respecting the diversity of local conditions and capacities, and recommend building a tailor-made operator model starting with what you already have in place. This Guidance Paper is about helping you to make your own informed decisions.

How are operator models selected?

Studying the 28 different case studies we have come to understand that a successful operator model in a particular location generally reflects the local problems, objectives as well as conditions and the capacities of the stakeholders.

In order to help informed decision-making we have conceptualised the decision-making process in a series of four steps (the last one in two separate sub-steps) as shown in the figure below.

Figure 7: The process of selecting an operator model



These steps can be taken by the organization or group of organizations implementing improvements and wishing to invest in the SWM sector. This may be a local or regional authority, a government agency or department, a development agency, or any organization or group of organizations taking on the responsibility to govern and/or finance the improvement of SWM services.

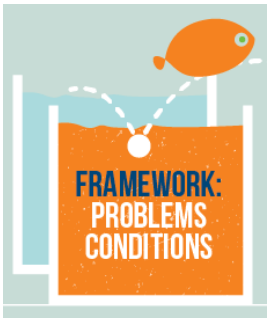
The selection of SWM operator models is a task that requires judgements to be made on the balance of facts and experience, in full consideration of the framework conditions.

Step 1: Identify problems and framework conditions

STEP 1: IDENTIFY PROBLEMS AND FRAMEWORK CONDITIONS.
This analysis will form the basis of the decision making process.

It is highly recommend that a committee (or group of experts) be established for this task. Part of the task may be delegated to a consultant or facilitator, who would be made responsible to go through the steps using a participatory approach, keeping all stakeholders involved in decision-making.

The committee or expert group should include at the minimum personnel from the local authority(ies), a representative of the national authorities responsible for SWM, and experts with different specialisations ranging from technical, social, economic and institutional backgrounds. Internal and/or external experts can be helpful to cover the more specialised technical, financial and institutional questions.



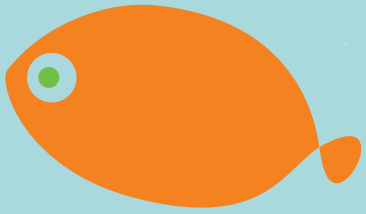
The problems and conditions that drive change, and the setting of local objectives, are closely linked to problems perceived by the citizens or regulatory authorities. They are real day-to-day problems. These include for example accumulation of waste due to lack of service or insufficient service or pollution caused by uncontrolled disposal.

Most of these problems are immediately obvious through the day-to-day work of municipal staff, from complaints received from the citizens, or through the inspection reports of regulatory authorities. The second column in table 1 (pg. 18) will help to make sure that issues are systematically considered when categorising the problems. These are the problems and framework conditions that were evident in the case studies but also come from the experience of the authors and contributors.

Framework conditions are those that influence or trigger action and are related to the requirements set forth in the policy or legislation of a country. These cannot be changed by local public authorities, operators or revenue collectors, but may be a driver for change.

TO DO:

- ESTABLISH EXPERT GROUP FOR SELECTING THE OPERATOR MODEL
- USE TABLE 1 AS A GUIDANCE CHECKLIST TO IDENTIFY PROBLEMS



Step 2: Formulate and prioritize objectives

STEP 2: FORMULATE AND PRIORITIZE OBJECTIVES

This step will enable you to define the scope of work and direct your decisions.

Having identified the problems in Step 1, this step prioritises them and formulates objectives. These local objectives drive change in the sector. When formulating objectives, it is important to note that objectives imposed through a top down approach, either through government policy or intervention of development agencies, prevail only if their adoption is through consultations, i.e. local municipalities and communities adopt these as their own and work for achieving them, or specific mechanisms to incentivise or force compliance.

The Objectives column in table 1 gives an account of the objectives that are formulated to meet the identified common problems and conditions. Getting your objectives clear is an important step towards the success of your operator model. Therefore, utilising the results of step 1, prioritise the identified problems and framework conditions to then formulate clear objectives to cover all identified problems.

Table 1: From problems to objectives

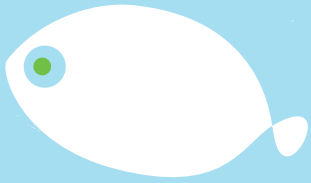
Problems and framework conditions	Objectives
Services driven by public health considerations	
☐ Frequent littering	Cleaning the city (Street sweeping)
☐ Dirty streets & public spaces	
☐ Dirtiness of areas of commercial or touristic interest	
☐ Low level of safety (conflicts, occurrence of crimes) associated with dirtiness of the streets	
☐ Waste overflowing litter bins	
☐ Drains & waterways filled with litter	
☐ Direct public health problems from uncollected waste - increased incidence of childhood diarrhoea and acute respiratory infections (from open burning) in areas without a regular waste collection service	Extending collection coverage to everyone (Primary collection)
☐ Difficulty in collecting waste in areas with poor infrastructure, such as unpaved or narrow streets	
☐ Indirect public health problems from uncollected waste blocking drains and watercourses - causing stagnant water, waterborne diseases, potential epidemics and flooding	
☐ Citizens demand for extending collection coverage to areas where such service does not exist	

☐ Public attention, complaints and mass media coverage related to the problems caused by accumulation of uncollected waste ☐ Existence of demand for improved waste collection service in areas which are currently served ☐ Slow and inefficient waste collection, delays in service ☐ Nuisance and odour connected to waste collection service ☐ Presence of accumulated waste around collection points	Modernizing secondary/ one-step collection
☐ Nuisance to the public caused by odour and pollution from unmanaged collection points & transfer stations ☐ Rapidly decreasing urban spaces for waste transfer activities ☐ Recognition of potential for economies of scale through transfer stations	Improving the transfer system
Services driven by Resource recovery	
☐ High incidence of poverty leading to widespread waste picking from the informal recyclers ☐ Citizens complaints about spreading of litter by informal recyclers whilst extracting materials of value from mixed MSW ☐ Lack of source separation of recyclables decreases the quality of the product ☐ Citizens demand for increased recycling performance ☐ Awareness of the pollution caused by disposal causing public demand for finding alternatives to disposal ☐ Unused capacities in the recycling sector, potential for market development ☐ Recycling targets stated in legislation not yet achieved ☐ Existence of the polluter & producer pays principles in legislation	Increasing recycling
☐ Awareness of the pollution caused by disposal ☐ Existence of source separation of organic waste to increase quality of the product ☐ Market demand for compost product ☐ Policy & legal drivers to reduce greenhouse emissions from the waste sector ☐ Offers on the table from technology suppliers	Improving waste treatment
Services driven by environmental protection considerations	

☐ Complaints, nuisance from waste disposal through odour, water pollution, smoke from open burning ☐ Poor environmental quality of waste disposal ☐ Land constraints restricting the expansion of existing waste disposal facilities ☐ Difficulties in planning/locating new waste disposal facilities ☐ Existence of national legislation or policy requiring higher level environmental standards of disposal ☐ Policy & legal drivers for reducing greenhouse emissions from the waste sector	Improving disposal

TO DO:

- PRIORITISE PROBLEMS (RANK IN ORDER THE PROBLEMS IDENTIFIED IN STEP 1)
- FORMULATE OBJECTIVES TO ADDRESS THE PRIORITY PROBLEMS MAKING SURE THE OBJECTIVES ARE ACHIEVABLE (USE TABLE 1 AS A GUIDE)



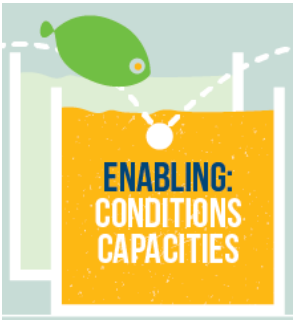
Step 3: Assess conditions and capacities

STEP 3: ASSESS CONDITIONS AND CAPACITIES

This analysis aims to produce a clear outline of the strengths and weaknesses of your situation.

This step requires you to assess the enabling conditions and capacities to ensure decision makers are well informed when selecting the SWM operator model(s).

Some conditions are essential for the implementation of a model. For example, when involving multiple micro-scale service providers for extending primary collection, the municipality should have sufficient staff to supervise the work of a large number of operators. Other conditions favour the selection of a certain model, for example fiscal facilities incentivising the creation of inter-municipal organizations.



The following checklists (tables 2-5) highlight issues to consider whilst planning SWM services. Table 2 concentrates on important capacities while tables 3, 4 and 5 concentrate on framework conditions. These are based on the case studies and the author group's experience and thus are not exhaustive. Your own assessment of capacities and conditions specific to your location will certainly bring up different issues with the following checklists providing common examples.

Client capacity: In most cases, the client will be the municipality. Here you need to assess for which tasks and services the public authority is likely to deliver and which would be wiser to out-source. A realistic assessment is essential otherwise the risk of overburdening staff or insufficient performance will put your ISWM system at risk.

Operator capacity: The operator may be the public authority, a public enterprise or a private company. Different sizes and types of companies lend themselves to different types of service. Before making a decision on the operator it is wise to assess the availability of potential operators and their capacity to deliver the service.

Economic conditions: Certain economic conditions favour different types of operator models. Therefore a careful assessment of the conditions in your city/region will help you to select the suitable option, or at least narrow down your choices.

Policy/Legal/Institutional conditions: Policy and legal conditions can steer decisions towards a certain model type. Therefore do not omit to assess your opportunities and constraints, considering the policy/legal/institutional framework.

Cultural/ Social conditions: Though not immediately obvious and not often on the assessment list of the technical department of public authorities, cultural and social conditions can play a decisive role in whether an operator model is successful.

Table 2: Checklist for understanding client and operator capacities influencing the choice of an operator model

Client capacity	Important when thinking about going for....
Is there technical capacity to run an open bid tendering process, including writing clear terms of references (TORs) and evaluating proposals?	Models with private sector participation.
Is there sufficient technical and management capacity within the pubic authority to negotiate favourable or equitable contract terms with the potential contractor/ investor?	Models with private participation where capital investment comes from private sources partially or entirely.
Are there sufficient experienced staff and resources within the public authority to monitor and supervise (control) as 'client' the delivery of the services?	Models with private sector participation, where operational budget is financed by the public authority
Are you able to access funds for technical assistance in tendering, contract management, monitoring?	Models where capital investment comes from International Financial Institutions (IFIs) or financing.
Is there capacity within regional or inter-municipal organisations to run waste management services & facilities as a 'client'?	A regional or inter-municipal model.
Operator capacity	**Important when thinking about going for....**
Are there micro-scale service providers already active in the waste management services?	Models with small-scale private sector participation for labour intensive services such as primary collection.
Are there suitable medium or large-scale providers interested in providing the service?	Models with private sector participation with medium to large-scale contractors.
Are there suitable and interested operators/private investors that could be attracted?	Models with private sector participation for capital-intensive contracts.
Is there experience and in-house capacity within the public authority for providing the service?	A public model for any service, especially important for resource recovery and treatment where the municipality traditionally does not have experience.
Does the operator need technical assistance in technology, entrepreneurship, accounting, and health, safety and environment practices?	Models with micro-scale entrepreneurs who might be lacking some or all of these skills and knowledge.
Does the operator need seed capital or access to financing to be able to buy the needed equipment and overcome cash-flow problems related to service provision?	Models with micro-scale entrepreneurs who might be struggling with capital investment and cash flow issues.

Table 3: Checklist for economic conditions influencing the choice of an operator model

Economic conditions	Does this condition matter?
Are there municipal or other public funds available for investment in modernizing the service?	If yes, then the public authority as client may be in a better position to close favourable lease type contracts with private sector operators or may choose a public model. If not, the municipality will have to attract private and/ or development investment funds that may influence the choice of operator model.

Economic conditions	Does this condition matter?
Is the municipal budget sufficient to cover operating and re-financing costs?	If yes, a public model may be an attractive option. If not, the model needs to be modified so that user charges may be introduced.
What is the capacity and willingness to pay for waste management services? Is there a demand to improve the service?	Important to consider when choosing a model financed through user charges or other non-municipal budget sources.
Are there large urban areas with poor infrastructure, sandy and/or narrow roads that are difficult to access?	If such areas are large, it's important to choose a user friendly low cost technical solution and model that may involve the citizens and may be carried out by community based organizations or other micro-scale contractors.
Are waste quantities to be handled sufficient to achieve economies of scale and/or to make the service attractive to a private operator/investor?	This is both a governance level question and an issue when trying to attract investment in a certain service. Feasibility studies are needed to determine economies of scale. Some activities, such as composting are less sensitive; others such as incinerators are very sensitive to economies of scale. Both technologies are sensitive to waste composition, and security of supply of the right type of waste.
Is a gate-fee at transfer station, treatment or disposal facility acceptable to the client and the users?	If yes, a separate private operator may be more attracted to invest in or operate such facilities.
Is the gate fee sufficient to finance investment, operation and re-financing of the facility?	If yes, private operators and investors will be easily attracted.
What is the degree to which the commercial entities and institutions pay for the full cost of waste management or handle their own waste at their own cost?	In case commercial entities pay sufficient to cross subsidize some of the costs of the residential users, then it's a good idea to capitalize on this opportunity. If not, then it's better to focus efforts on the residential users.

Table 4: Checklist for policy/legal/institutional conditions influencing the choice of an operator model

Policy/Legal/ Institutional conditions	Why does this condition matter?
Are there specific financial incentives or subsidies granted to public or to private operators?	Important when thinking about private versus public models.
Are there specific financial incentives or subsidies granted to inter-municipal organizations?	Important when thinking about the level of governance you wish to select.
Are there laws and legal instruments that enable the 'private' sector to deliver 'public' solid waste management services?	Important to recognize or rule out legal barriers when considering a private sector participation model through service contracting.
Is there a legal framework in place for establishing PSP type joint ventures?	Important to recognize or rule out legal barriers when considering a public private partnership model.
Is there a legal framework in place for establishing inter-municipal organizations (associations and/or public companies)?	Important to recognize or rule out legal barriers when considering an inter-municipal model.

Policy/Legal/ Institutional conditions	Why does this condition matter?
Is there recognition in policy or law of the existence and added value of the private formal/informal recycling sector?	Important to recognize or rule out legal barriers when considering the choice of model for integrating the informal sector.
Is there producer responsibility/product stewardship legislation in place?	This is an additional push to the market and has the potential to create demand for more recycling.
Is policy related to waste management changing often or likely to change in the future? And in this regard does the client need to make sure it stays flexible in the technical solutions it has access to so that it can fulfil its responsibilities in the sector?	Important to think about when considering going for a large-scale treatment or disposal project where the local authority has no direct ownership and control of the assets. This type of facilities may lock an important part of the waste stream into a treatment solution for an extended period of time.
Is there sufficient and reliable data about waste generation rates and forecasted waste generation rates to allow the client to negotiate contracts that involve guaranteed waste amounts?	Important to check when entering into negotiations with a model with private financing for a resource recovery/ treatment plant, incinerator or landfill.
Does legislation require disposal in a sanitary landfill?	Private operators are more likely attracted to enter into design build finance operate type of arrangements if there is a requirement for high environmental standards, in this case they can bring a real value added, speed in contracting and execution and are more likely to receive higher gate fees.
Are the roles and responsibilities of institutions within and between different levels of government clearly established?	Important when thinking about models at different levels of government.

Table 5: Checklist for cultural/social conditions influencing the choice of an operator model

Cultural/ Social conditions	Why does this condition matter?
Are there social objectives formulated such as increasing employment or alleviating poverty that could be addressed through this sector?	If yes, then the most appropriate models will be those that can accommodate labour intensive solutions, such as public models or working with micro-scale service providers.
Is there a cultural tradition for civic participation in cleaning the city?	Important when thinking of a participative model either in operation (i.e. carrying the waste to a communal container) or in revenue collection or taking on part of the management or monitoring tasks (client function).
Is there awareness of the importance of waste management and resource recovery?	
Is there a demand for increased level of cleanliness in certain areas that manual sweeping is not able to address? (e.g. high traffic zone)	A different technical solution and a different operator may be needed for these specific areas.
Is a relationship of trust and familiarity between service providers and users important?	This is especially important if the technical solution is such that there is a need for communication and cooperation between user and operator.

Cultural/ Social conditions	Why does this condition matter?
Would users be likely to cooperate better with the public authority, with one of their community members or with the representatives of a medium-large size company?	For example in the door-to-door collection method the operators enter into direct contact with each user when collecting waste and then who the operator is may make a world of a difference.
Is it likely that the procurement process will be transparent? Is risk of corruption high?	This is an important when thinking about choosing a private model.
Is there a need to step up against unfair market practices such as monopolies or cartels? Are there artificially high prices imposed by the private sector for services?	In case yes, this may trigger a public authority to choose a public model.
Are there specific cultural issues, related to management style, communication, payment rates, etc. and what type of operator is likely to be able to deal with these easily?	May be important and need to be managed when involving foreign or international operators.
Is there recognition amongst the community and the municipality for the work of the private formal/informal recyclers, pickers, collectors etc.? Or how can such recognition be achieved?	To be considered when selecting a model that involves/ integrates the informal sector.
Do financing institutions impose conditions?	International financing organizations/development agencies may condition investment financing on certain requirements regarding the future operator model.
Is there a good relationship and tradition of cooperation among the municipalities?	This is important to consider when deciding on the level of governance, e.g. regional or inter-municipal services.
Do citizens trust the public authority, especially in their role of 'revenue collector' for waste management services?	If yes, it may be appropriate to assign the role of revenue collector to the public authority. If no, the public authority may be wise to delegate the revenue collector function to the operator or an independent body (e.g. electricity or other utilities company).

TO DO:

- USE THE CHECKLIST IN TABLE 2 TO UNDERSTAND CAPACITIES THAT INFLUENCE THE CHOICE OF THE OPERATOR MODEL
- USE THE CHECKLISTS IN TABLES 3, 4 AND 5 TO UNDERSTAND CONDITIONS THAT INFLUENCE THE CHOICE OF THE OPERATOR MODEL
- CROSS OUT ISSUES ON THE CHECKLISTS THAT ARE NOT RELEVANT TO YOUR SITUATION
- ADD CONDITIONS AND CAPACITIES THAT ARE SPECIFIC TO YOUR SITUATION AND ARE NOT ON THE LIST

Step 4A: Understand the different generic model types

Understanding the political & economic dynamics that influence the SWM system in two distinctly separate ways (i.e. meeting the public needs while understanding the financial limitations) will help you to understand the diversity of opinions and eventually to find a balanced solution that can be acceptable and implementable.

Table 6 can be used as a tool to help develop your understanding and discuss the generic model-types most appropriate to your local situation.

Table 6: Conditions and capacities influencing the selection of a private or public operator model

	Conditions and capacities		Pro Public	Pro Private (PSP)
Capacities	Capacity of Client	Experience in engaging with the private sector	Limited and/or negative	Positive experience and/ or desired even if current experiences are limited.
Conditions	Cultural/ Social	Embedded belief of the local public authority about private sector participation in waste management Trust of population in the local public authority as revenue collector.	"Private sector involvement brings no benefits, or too much risk"	"Private sector participation is beneficial in terms of new skills, efficiency and operational performance"
	Policy	Locally established governance objectives	Focus on social aspects such as affordability and job creation	Focus on economic efficiency and cost recovery
	Legal	National legislation, policy and fiscal facilities	Support public sector	Support participation of the private sector
		National legislation, policy and fiscal facilities Support public sector Support participation of the private sector	Not available	Available
	Economic	Market practices of private sector in waste management	Unfair, monopolistic or carteling practices	Fair and open
		Pool of private companies working in waste management	Not available	Available

Municipal versus inter-municipal models

Inter-municipal models require a higher level of governance and an effective cooperation of two or more municipalities. Co-operation is driven primarily by economies of scale - higher transport costs from longer haul distances are balanced by lower specific costs per tonne at a larger, regional treatment facility or sanitary landfill. The conditions and capacities that favour the choice of a certain level of governance are shown in table 7. Understanding the strength of opinion of either side will help you to find a balanced position.

Table 7: Conditions and capacities influencing selection of a municipal or inter-municipal operator model

	Conditions and capacities		Municipal	Inter-Municipal
Capacities	Capacity of Client	Experience in inter-municipal initiatives in other sectors or other regions	Limited and/or negative	Positive experience and/or desired even if current experiences are limited.
	Cultural Social	Relationship between municipalities in the region	Traditionally or politically segregated, characterized by mistrust, tension and/or conflict	A tradition of good cooperation, and openness to entering partnerships
Conditions	Policy Legal Institutional	Locally established governance objectives	Focus on social aspects only such as affordability and job creation,	Focus on economic efficiency and cost recovery
		National legislation, policy and fiscal facilities	Support for municipal systems	Support for inter-municipal facilities
		Legal framework for establishing inter-municipal organizations	Not available	Available
	Economic	Focus on economic efficiency	-	Economies of scale are possible through inter-municipal cooperation

Integrated versus singular services

In practice there is hardly any model that is fully integrated (where all aspects of the SWM services are provided by one all encompassing system); there will likely always be some little part of the service here and there that is differently arranged.

Integration can make sense when a commercially very attractive service can be bundled together with another one that is not so attractive, but is nevertheless part of the municipal obligation. In this way the operator does not only take on the profit-generating activity but also non-profitable public service obligations.

Other times bundling of services makes logistical sense and brings superior overall efficiency. For example bundling primary and secondary collection potentially spares the municipality some management effort, or bundling transfer and disposal offers a unified control over the monitoring of expenditures of the services that follow collection in the waste management chain.

Keeping services separate may in some cases create an incentive for increased resource recovery, for example a high gate fee or landfill tax encourages diversion from disposal to recycling/recovery if the operators of landfill

and collection are different. Similarly, it may just make sense for different parts of the waste management service to be operated by companies of different types and sizes; not least to promote competition, transparency and a culture of service performance.

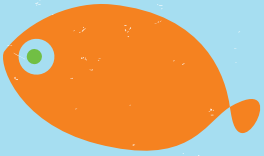
Table 8 can help or prompt you to understand things from different perspectives.

Table 8: Considerations influencing integration of services

		Singular service	Integrated service
Service elements	Sweeping	People place waste in bins or bags or communal containers in an organized way	When part or most of the municipal waste ends up in the street instead of primary storage, then integrating the sweeping and primary collection makes sense.
	Collection	Large areas need special attention and equipment due to poor infrastructure and difficulty in accessing areas	Areas that need special equipment are scarce and can be relatively easily managed
	Resource Recovery & Treatment	Keeping resource recovery separate would keep the sector more labour intensive, securing more livelihoods at low or no cost to the municipality.	Integrating resource recovery activities may attract private investment and ensure a modern facility.
	Disposal	Keeping the disposal service singular and charging a relatively high gate fee may encourage recycling, composting and other resource recovery and treatment activities	Integrating resource recovery with treatment and disposal could bring benefits to the local authority as some of the sales revenues from resource recovery may co-finance operation of the disposal site.

TO DO:

- USING THE CHECKLISTS IN TABLES 6, 7 AND 8, DECIDE WHETHER:
  YOU PREFER PUBLIC OR PRIVATE MODELS
  YOU PREFER MUNICIPAL OR INTER-MUNICIPAL MODELS
  YOU PREFER TO INTEGRATE SERVICES OR KEEP THEM SINGULAR
- NOTE YOUR PREDOMINANT PREFERENCES TO ASSIST WHEN REVIEWING THE 42 COMMON OPERATOR MODEL OPTIONS IN THE NEXT SECTION.



Step 4B: Select from the common operator models

At this point for each service along the waste management chain you will have to consider the generic dimensions discussed in step 4A above and following the definition of the operator model:

- The location of the "client", "operator", "revenue" function;
- Service arrangements (contracts and ownership of assets)
- Service management (monitoring and control)
- Money flows (sources and uses of funds for operation and investment)

To simplify this task, make use of the tool that guides you through a step-wise decision process along the waste management chain, and arrives at a set of Common Operator Models *(coms)* for your particular system. The following chapter describes each *com* that our research has found to be most frequently applied across the world.

The codes of the coms will help you quickly locate the detailed description of the model you are interested in.

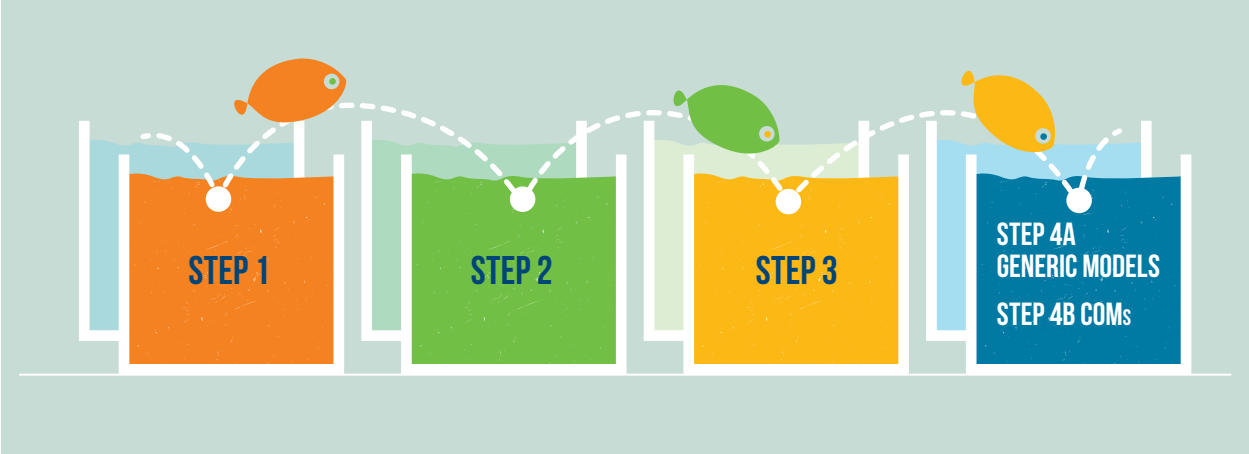
Each model has some inherent advantages and disadvantages. For example it is common within public models that keeping track of costs and cost accounting is weaker because cost-efficiency is not that much of an issue for a publicly operated service. The descriptions below include the likely advantages and disadvantages of each com, giving a hint about aspects of management that are likely to need more effort and attention if a certain model is chosen.

Selecting the appropriate operator model or mix of models is an iterative process that involves the judgement and experience of the decision-makers and facilitators. Once a set of models to implement has been selected, return to Step 2 and 3 to re-evaluate whether the specific local conditions are favourable and capacities are sufficient to implement these, both from the operator and client side.

TO DO:

- OPEN UP THE OPERATOR MODELS TOOL (ANNEX B - PAGE 50)
- GO THROUGH THE QUESTIONS LIST TO SELECT COMMON OPERATOR MODELS (COMs) ALONG THE WASTE MANAGEMENT CHAIN
- NOTE DOWN THE COMs YOU HAVE SELECTED USING THEIR NUMBER (EACH HAS A UNIQUE NUMBER ATTACHED)
- RETURN TO STEPS 2 & 3 TO CONFIRM SUITABILITY OF COMs SELECTED

Figure 8: Process of selecting operator models



Reiteration:

- Go to the next chapter on "Common Operator Models" to read more details about the advantages and disadvantages of the *coms* you have selected.
- In case you find too many disadvantages go back to the tool and choose a different *com* or combination of *coms* using the tool.
- Go then to Steps 2 & 3 to the checklist to see if your coms are suitable to local conditions and capacities.
- In case too many conditions and/or capacities are missing go back to the tool and select a different com or combination of *coms*.

FINAL THINGS TO DO:

- EXPECT THAT THERE IS NO PERFECT FIT AND KEEP IN MIND THAT ANY MODEL CAN BE MADE TO WORK.
- WHEN YOU ARE DONE WITH SELECTION GO TO THE LAST CHAPTER OF THIS BOOK TO FIND OUT "HOW TO MAKE THE BEST OF YOUR OPERATOR MODEL"

Making the best of your operator model

Once an operator model is selected and adjusted to the local objectives and capacities, a lot depends on the people implementing it, the talent, seriousness and motivation that are shown in the day-to-day work. People can make or break any model!

Our research points to some issues that are key to making the best of any model.

Capacity of the public authority as "client"

The client, the authority responsible for ensuring the provision of a reliable SWM system meeting the required standards, has a pivotal role. Strong clients backed by strong local political will to change things are the key to a good SWM system.

Technical and financial capacity of both client and operator are important, but perhaps more important is an understanding of where the strengths and weaknesses are in terms of these capacities, and managing things accordingly.

The management capacity of the client is important. Regardless of whether a model is municipal, intermunicipal or has private sector participation or not, it is important that the institutional roles of client, operator and revenue collector are understood, and clearly assigned. Each of these roles has a different function in providing waste management services and they each require a different set of capacities and skills.

Management

A variety of key management aspects associated with success in implementing and sustaining different operator models came to the forefront through the research:

High user inclusivity - the extent to which the users of the system have access to and influence on how the system works - is relevant to the management of services under all model types. This includes efforts to increase levels of awareness, measure customer satisfaction, involve people in decision-making; and having a good complaint and grievance-handling mechanism in place that creates a solid foundation for civil society involvement in the waste management system.

Choosing solutions based on technical and financial assessment and criteria ensures investment in systems that are suitable and connect well into the systems, infrastructure and technologies already functioning on ground, while making sure that the upgrades are affordable.

Ensuring a low level of corruption through transparency in both decision-making and procurement will result in a better system. Simply put, the available resources are going where they are supposed to, maximizing the benefits to the citizens (customers) of the service.

Data management: Having a good basis of reliable and consistent data to use when choosing technical solutions, designing scaling and planning logistics enables better decisions and is a must when setting up contracts with private sector companies. Availability of regular data also allows for tracking and monitoring, and is a great tool for managing the delivery of services.

Starting small and scaling up or rolling out reduces the risks that are associated with any change made in the system. It is better where possible to first test out the idea, learn the lessons on a small scale and improve the solution before extending it to an entire city.

Decentralized management and monitoring, especially in collection services, has proven to be efficient in many of the cases studied. This might be due to the fact that, unlike other utilities, metering cannot be applied to waste management services, while the user has the easy of dumping or burning their wastes if the operator stops collecting the waste. Therefore it is important to moni-

tor activities on the ground through mobile supervisors, and to be able to react to the immediate needs and correct the problems at the local level.

Institutionalizing good management practices is beneficial to every operator model. Once the appropriate practices and ways of monitoring and management are identified and tested, these will outlive their initiator so long as there is a management system in place that keeps these good practices alive.

Focusing on household waste helps concentrate scarce resources and efforts, and leads to better results in SWM handling. This means dealing with large commercial waste generators, or with inert, hazardous, agricultural or other special wastes, through separate or parallel arrangements.

Cost accounting is a common sense good management practice, and is necessary for public sector service delivery as much as when the private sector is involved.

Working towards recovering the costs of both operation and replacement of vehicles and equipment from users of the service, either through user charges or local taxes, keeps the service running at a reliable quality.

Financial transparency is important to keep client, operator and user aware of the cost of the service and the budget available, and bind them together in a service-payment relationship. Even if it is not possible to cover all costs from the local budget, being aware of the cost and revenues, and working towards balancing the budget increases the reliability of the service. This may be because the participants in the operator model anticipate potential problems and gaps, and may be more inclined to work together to find solutions.

Some models are inherently weak in financial management practices and some are inherently strong. For example in a PSP model, the monitoring and control capacity and skills of the client, and the attention to this activity will be inherently stronger as compared to monitoring and control in a public model. This is simply because in a public model the authority is not being checked by an external party and there is less imminent threat that a publicly run service will run bankrupt or will be penalized for lack of performance as it is with a privately operated service.

On the other hand, the public models will be perhaps more likely to start small and scale up, being more focused on the successful outcome than on making a profit and on economies of scale.

Lessons for development programmes

Development programmes and projects can help by paying special attention to catalysing indigenous processes of learning and scaling-up best practices; either through a) technical assistance and capacity building linked to investment programmes and projects, or b) including benchmarking of the performance of client and revenue collector functions (as well as operations) as part of the routine monitoring attached to budget support financing.

Whether you are a public authority, a person sitting on the committee set up to select a model, an operator or a waste management practitioner, you are dealing with a complex, sometimes frustrating, but ultimately very worthwhile task. There is a lot to learn while figuring out how to improve SWM systems.

We wish you great success with your own professional journey!

Annex A: Common operator models

This Annex complements Step 4B by providing additional details on the 42 identified coms and is structured around the various local objectives as identified in Step 2 of the selection process (as shown in Table 1, see pg. 13). The local objectives relate to improving sweeping, primary collection, "one-step" collection, transfer, recycling, composting, treatment and landfill. A final section describes common integrated models.

When defining the operator models, we have noticed that in sweeping and collection up to transfer stations the key issue is: *"who is the operator?"* After transfer, as installations get more expensive, the key question becomes: *"who owns the fixed assets?"* The definition of the coms reflect this.

Cleaning the City

Sweeping services are usually the number one priority of municipalities as they are driven by the need and demand for public health and cleanliness. Management of sweeping services is most often decentralised and sometimes focused on litter control.

com	Type	Description	Advantage	Drawback
1	**Public model: sweeping.** Street sweeping by public authority staff.	Workers hired by the public authority to sweep the streets, picking up debris, litter, forming and clearing piles of waste left on the street, and placing the material into containers or collection vehicles.	Experienced operator. Modern cleaning equipment may be purchased and maintained.	Workers can be demotivated and monitoring and control can be weak.
2	**Resident's model: sweeping.** Sweeping through Residents or Resident Association.	Public authority delegates the management and monitoring of sweeping (the client function) to residents associations, who make their own arrangements to hire CBOs or individual sweepers. Alternatively residents get involved in cleaning the streets they live on.	Service is at no or low cost to the municipality. Higher level of cleanliness due to competition between residents or resident associations.	Needs sustained effort from the citizens. Public authority needs to still perform spot-checks. No direct control over level of cleanliness.
3	**Micro PSP: sweeping.** Street sweeping contracted to micro-service providers.	NGOs or CBOs are hired to sweep the streets as a combined service together with primary collection, contracted to serve specific zones.	Higher level of cleanliness possible.	Needs increased monitoring and management efforts; (e.g. 1 inspector per 10 -15 micro service providers)

com	Type	Description	Advantage	Drawback
4	**PSP: sweeping.** Street sweeping contracted to a medium size or large company.	Private companies hired to sweep the streets as a singular service item and contracted to serve specific zones.	Higher level of cleanliness possible. Modern cleaning equipment can be purchased and maintained.	Relatively higher cost.

Financing of operations for street sweeping/cleaning is usually by the municipality from local budget. Sometimes the cost is recovered as part of the user charge for waste collection. The revenue collector is most commonly the public authority, but may also be the operator or a third party that collects the waste management fees.

Extending primary collection

Extending collection is especially a challenge in suburban, peri-urban or low-income areas with poor infrastructure. **Thus primary collection is an extension of the regular waste collection service into these areas.**

The most frequently encountered methods of collection service are the block collection and communal collection methods. The block collection system a vehicle travels a regular route at pre-determined frequencies and alerts waste generators to bring their waste to the vehicle, while in the communal system the waste generator takes waste to containers at fixed location in the neighbourhood (Coffey and Coad, 2010). Collection is often carried out with manual or animal traction collection equipment, such as handcarts, tricycles, carriages etc.

It is not unusual for private-to-private arrangements to appear in areas that are not serviced. These are best eventually integrated or formalized into a regular and reliable service provision, but doing so may not be so straightforward.

com	Type	Description0	Advantage	Drawback
5	**Public model: primary and secondary collection.** Primary collection by the public authority together with secondary collection.	The public authority provides primary collection/door to door services, as an integral part of the overall waste collection service.	Experienced operator. Direct control over service provision.	Workers may be demotivated. Inherently weak monitoring and control if inspection and operation functions are not clearly separated. More likely to depend on national or local budget for financing.

com	Type	Description0	Advantage	Drawback
6	**Micro franchise PSP: primary collection.** Primary collection by micro-service providers (MSPs) as a singular service item, with revenue collected by the MSP.	Micro-scale service providers are franchised to provide primary collection/door to door services, and collect a small service fee from the door. Predominantly short term (2-5 years) area based contracts based on invitation.	Friendly and familiar system. Can be flexible and cost efficient. May facilitate rapid rollout to unserved areas.	Increased monitoring is needed otherwise waste collected may not end up in the designated sites. Risk of waste accumulation in case of non-payment as the operators will only collect waste if they are paid for the service.
7	**Micro contracted PSP: primary collection.** Primary collection by micro-service providers (MSPs) as a singular service item, with revenue collected by the public authority.	Micro-service providers are contracted to provide primary collection/door to door services, and are paid for the service by the public authority. Predominantly short-term (2-5 years) area based contracts based on invitation.	Friendly and familiar system. Can be flexible and cost efficient. Control over non-payers is possible.	Micro-management and increased monitoring is needed, otherwise waste collected may not end up in the designated sites.
8	**PSP: primary and secondary collection.** Primary collection by medium-large private service providers together with secondary collection.	Medium-large scale private operators provide primary collection/door to door services, as an integral part of the overall waste collection service. Medium-longer term (5-15 years) and larger area contracts attributed through a bidding process. The service needs to be adjusted in areas with more difficult infrastructure; in these areas subcontractors or additional employees may be used.	Can be a flexible and cost-efficient solution. Less management and monitoring effort is needed from the public authority as the contractors take on part of these tasks in the areas where primary collection is needed.	More costly. Less responsive to local demand for primary collection service. Public authority has less direct control over extent and quality of primary collection service.

Primary collection is a service that is generally financed through user fees. The findings of our research reinforce earlier findings (Scheinberg A., Rodic-Wiersma L., Wilson D.C., 2010) that users are willing to pay at the very least for primary collection, regardless of their income level. Therefore it is common that in the private sector participation models service users pay a user fee for waste collection that covers at least the costs of primary collection, but may cover to some extent other costs (post-primary collection) as well.

The revenue collector for this service is most commonly either the operator or the public authority.

Improving "one step" collection

com	Type	Description	Advantage	Drawback
9	**Public model: secondary/one-step collection.** Secondary/one-step collection by the public authority.	The public authority provides either a one-step or the secondary collection service. The service costs come out of the public authority budget, and revenue is collected via taxation systems and/or government subsidy.	Experienced operator, no dependence of private operator's equipment.	Inherently weak monitoring, control and financial management. Services may be run as a cost centre with less attention to efficiency. May rely more on public funds.
10	**Public enterprise: secondary/one-step collection.** One-step or secondary collection service by a public enterprise.	The public authority establishes a public company or enterprise to provide the services. Revenue is collected via taxation systems and/or government subsidy, with billing either managed by the enterprise or via the public authority.	Experienced operator. Good management, monitoring, control.	Inherently weak financial management. More likely to be run as a cost centre, with less attention to efficiency. May rely more on public funds.
11	**PSP service contract: secondary/one step collection.** Secondary/one-step collection with medium-large companies under service contracts with and paid for by the public authority.	The public authority contracts out the provision of either one-step services or the secondary collection service to a PSP, and pays for this service. The public authority owns part or the whole of the assets, and leases these for the use of the PSP contractor. The service contracts are usually medium term 5-15 years contracts based on serviced areas and attributed through a bidding procedure.	Cost efficiency; Good monitoring and control. In case companies underperform they get penalties or payment reductions. Efficient financial management.	No private investment. Attention can be placed on maximising revenue rather than service coverage and performance. Requires strong client competence.

com	Type	Description	Advantage	Drawback
12	**PSP concession contract: secondary/one-step collection.** Secondary/one-step collection with medium-large companies under concession contracts with and paid for by the public authority.	The public authority grants a PSP the exclusive right to operate, maintain and carry out investment for one-step services or secondary collection service, and pays for this service. The private operator is required to make and sustain the necessary investments in collection vehicles and other equipment. The concession contracts are longer term (8-25 years) to allow recovery of investments. Contracts are based on serviced areas and attributed through a bidding procedure.	Cost efficiency; Good monitoring and control. Efficient financial management. Access to private investment. Knowledgeable and capitalized operators.	Risk of loss of direct control of the municipality to (re)negotiate contract terms or loss of power to intervene in case of emergency situation. Increased risk of corruption, since the economic interests can be relatively high.
13	**PSP franchise: secondary/one-step collection.** One-step or secondary collection service carried out by private service providers under a franchise or open competition model.	Private service provider is licensed/ franchised to provide services, and granted the responsibility and right to collect their own revenue from municipal waste generators. The franchise contracts are longer term (8-25 years) to allow recovery of investments. Contracts attributed through a bidding procedure.	Low management efforts for securing financing of operations. Performance based contracts allow control of service quality.	Low payment rates and no legal mechanism at the operator to constrain the non-payers. This may cause accumulation of waste or illegal dumping. Areas may be serviced by more than one operator leading to structural inefficiencies.
14	**PSP joint venture: secondary/one-step collection.** One-step or secondary collection service carried out by joint venture public/private companies	Joint venture companies are established between the public authority and a PSP to provide collection service.	Access of municipality to operational decision-making. Access to private investment and expertise.	Inflexible solution, as it involves a long-term commitment to a single service provider/partner. Requires a strong client to specify and negotiate terms of partnership. Governance procedures can be difficult to set and change.

Modernizing collection means improving the quality and upgrading technology of the waste collection so as to increase efficiency of the service.

Such modernization is most relevant to the secondary or “one-step” collection service that is traditionally done by motorized equipment in areas where infrastruc-

ture permits the entry of motorized vehicles. It usually includes buying new equipment, mechanizing collection where possible and optimizing collection routes and compaction ratios. However, in tropical countries, where organic content of waste is high and the waste tends to be quite dense, compaction is not as critical as efficiency, especially if the local roads are not suitable for high loading rates (Coffee and Coad, 2010).

Financing of secondary/one-step collection is usually from user charges or from local budget. Public models may be relying partially on central government funds. In PSP models, the burden of investment financing and refinancing is sometimes shared by the public and private contracting parties. Revenue collector may be either the public authority through taxation or the operator or a third party, such as the electricity, water or other public utility company.

Commercial waste collection

Commercial waste collection may be carried out by the household waste collection operator as described in one of the model options above, or it may be organised as a separate service. There are some advantages and drawbacks to both options as presented below.

com	Type	Description	Advantage	Drawback
15	**Public model: commercial collection.** Commercial waste collection services carried out by the public authority.	The public authority provides combined municipal and commercial waste collection services, and collects the revenue via taxation to cover the costs.	More direct control over entire waste collection system.	Less revenue from commercial waste generators. Less responsiveness to demand.
16	**PSP franchise: commercial collection.** Commercial waste collection carried out by the designated PSP.	Private service provider is granted the responsibility and right to collect commercial waste in a certain zone, collecting their own revenue from commercial waste generators.	Demand responsive. Contractual mechamism in place to avoid illegal dumping. Potential to raise revenues through applying higher charges cross-subsidising household waste collection.	No competition between service providers. Commercial sector may wish for different types of service than offered.
17	**PSP open competition: commercial collection.** Commercial waste collection by private service providers under open competition model.	Private service providers compete for direct contracts with commercial waste generators, regardless of geographical location, collecting their own revenue from commercial waste generators.	Demand responsive. Potential to raise revenues through applying higher charges cross-subsidising household waste collection.	If users do not pay there is no contractual mechanism in place to avoid illegal dumping.

In most cases waste collection from commercial entities is financed through user charges. This may be collected by the operator of the collection service (be it public or private) or the transport may happen at their own cost in their own vehicle and a gate fee is paid at the receiving facility, be it a transfer station, treatment facility or disposal site.

Improving transfer

Introducing or improving transfer stations are driven by the need to improve the cost efficiency of the logistics when waste needs to travel long distances to the point of disposal. They also may need to be improved to reduce nuisance caused by waste accumulation around collection/transfer points in the inner-urban area.

In terms of technology there is a large variety of transfer stations from which one can choose based on quantity of waste to be handled, size of plot of land available, population density, existing equipment and solution for collection, etc.

com	Type	Description	Advantage	Drawback
18	**Public model: transfer.** Transfer by public authority or enterprise.	The public authority finances, owns, builds and operates the transfer station(s) either directly or through a public company. Financing of operations is through the public authority budget.	The public authorities are somewhat experienced in operation. There is no incentive for double counting of waste to gain unfair advantage.	Inherently weak monitoring, control and financial management. Lower environmental performance.
19	**PSP service: transfer.** Transfer services provided by PSP under service contract with and paid by the public authority.	Public authority finances the design, construction and operation of the transfer station, tendering the operations to the private sector, either linked to the collection or disposal service contracts, or contracted independently of these services. The public authority pays for this service based on the tons handled and owns assets.	Experienced operator. Good management, monitoring, control. Environmental performance can be easily enforced.	Less control over the waste management system interfaces. No private investment funds attracted;

com	Type	Description	Advantage	Drawback
20	**PSP concession: transfer.** Transfer investment and services by PSP under concession contract with and paid by the public authority.	The public authority grants a PSP the exclusive right to operate, maintain and carry out investment for transfer service, and pays for this service based on the tons handled. The private operator is required to make and sustain the necessary investments in fixed and mobile assets.	Private investment funds attracted. Cost efficiency; Good monitoring and control. Efficient financial management. Environmental performance can be easily enforced.	Less control over the waste management system interfaces. Risk of double counting waste handled to increase the payments received from the pubic authority.

Transfer station operation may be integrated at the back-end of the collection services contract or the front end of the treatment-disposal contract or exist as a singular service. Therefore the revenue collector and source of financing may be similar to those in collection, i.e. part of a user charge or the payment based on quality of service from the public authority to the operator. Or it may be similar to the arrangements in a treatment plant or disposal facility, i.e. based on a gate-fee collected either from the public authority or the operator delivering waste at the gate.

Increasing recycling

By recycling we understand the segregation, separate collection, sorting, pre-processing and processing of the secondary raw materials derived from waste. Recycling is driven either by demand, i.e. the market value of the material, or by policy requirements to increase recycling, or both.

com	Type	Description	Advantage	Drawback
21	**Public model: recycling.** Collection and sorting of recyclables by the public authority or enterprises.	Separate collection and sorting of dry recyclables, or facilities for sorting mixed municipal waste with or without RDF production are financed and operated by the public authority.	Potential to generate revenues for the public authority (client).	Inexperienced operator; inherently weak monitoring and control, costly system, displacing informal sector. Expensive solutions with little consideration to economies of scale in logistics.

com	Type	Description	Advantage	Drawback
22	**PSP service: recycling.** Collection of recyclables by the private sector under contract with the public authority.	PSP provide separate collection service for recyclables under a service contract, with net costs paid for by the public authority.	Experienced operator. Contract can specify user-friendly system. Adaptable to new/updated service specifications. Potential to generate revenues to offset net service costs.	System can be costly. Potential to displace informal sector. May not have economy of scale, depending on the location of the client function.
23	**PSP franchise: recycling.** Collection and sorting of recyclables by the private sector under franchise contract with the public authority.	Recycling systems are financed and operated by the private sector under a franchise arrangement with the public authority, potentially requiring payment of an 'avoided landfill gate fee' to the franchisee.	Highly attuned to market demand, business-oriented and facilitates access to investment. Relatively efficient system.	Driven solely by market demand. Limited control over service specifications. May limit ability to meet recycling targets. Operators will act in their business interest.
24	**PSP open competition: recycling.** Collection and sorting of recyclables by the private sector (informal/formal) in open competition.	PSP recyclers (informal or formal) access and extract recyclable materials of value at various points in the waste management chain including door-to-door collection, from containers, transfer stations and disposal sites.	Efficient service provided free of charge. Protection and creation of green jobs and livelihoods.	Limited investment. Difficulty increasing Health, Safety and Environment (HSE) practise and eliminating child labour.
25	**Private EPR: recycling.** Client and revenue collector functions delegated to extended producer responsibility organisations set up and managed by producers, importers	Producers, importers and distributors of goods, e.g. packaged fast moving consumer products, either mandatorily or voluntarily (or both) establish funds and organisational arrangements to support recycling systems tailored to specific materials streams.	Experienced operator. Assures additional investment and demand in the market. More quantities and materials recycled. Good control over EHS standards.	Only functions if EPR legislation is in place. Consumer prices go up fractionally as recycling costs show up in product prices. Needs monitoring from national authorities.

com	Type	Description	Advantage	Drawback
26	**Public EPR: recycling.** Client and revenue collector functions delegated to extended producer responsibility organisations set up and managed by public authorities.	Government imposes a levy or tax on the import of packaging and other materials, with the funds directed to a national recycling fund for expenditure on support recycling systems tailored to specific materials streams.	Government imposes a levy or tax on the import of packaging and other materials, with the funds directed to a national recycling fund for expenditure on support recycling systems tailored to specific materials streams.	Systems may be bureaucratic. Consumer prices go up fractionally as recycling costs show up in product prices. Collected funds may be absorbed into national budget rather than spent on the intended purpose. Needs clear governance procedures.

Recycling is a straightforward business before it becomes a policy driven activity. Whilst some materials in the waste stream have a positive value, very often recycling as a public service is a net cost activity that needs to be supported through policy in order to drive waste management practices 'up the hierarchy'.

As such, revenues for recycling come from the market price of the secondary materials or from a subsidy system or both. The subsidy system may be direct, in this case recycling is financed directly from public authority funds, local or national, or may be indirect and function through some sort of extended producer responsibility/ product stewardship system, involving product charges or other economic instruments.

In producer responsibility recycling systems, the revenue collection function is delegated to a privately or state run organisation who collect fees from the entities placing goods on the market.

Many cities in developing countries have a private, entrepreneurial (often called an 'informal') recycling system, which operates largely outside and independently of the formal, municipal, solid waste management system. The sector is entirely self-supporting financially, with sole source of income being that from selling the separated materials into the local secondary materials value chain.

Previous work by GIZ has shown the importance of this sector, both in terms of the high recycling rates often achieved and the resulting financial savings to the city (in terms of avoided waste collection and disposal costs) (Scheinberg A., M. Simpson, Y. Gupt et al, 2010); and also in providing a livelihood to large numbers of the urban poor.

Where PSP or Public models are being considered to boost recycling, the selection and design of operator models should take the existing informal practices into careful consideration, and seek to build upon rather than replace them.

Composting

In developing countries, composting can have a higher success rate as compared to incineration or mechanical biological treatment as it is less sensitive to economies of scale and conditions are favourable to composting due to the high organic fraction of waste in low and middle income countries and favourable weather conditions for bio-degradation.

Before going for composting, market demand needs to be assessed and if buyers do not exist, efforts may be needed to develop the market before investing into a composting facility.

com	Type	Description	Advantage	Drawback
27	**Public model: composting.** Composting established and managed by the public authority.	The public authority develops and operates the composting plant.	Potential to generate revenues to offset the net costs of composting.	Inexperienced operator; inherently weak monitoring and control. Lack of attention to product quality may lead to costly system.
28	**PSP concession: composting.** Composting facilities established and managed by PSP.	The private sector finances and operates composting plant independently, and secures contracts from the public authority for the input material. These types of arrangements are more frequent for commercial scale composting.	Access to investment and expertise. Market based flexible solution.	May not be feasible without payment of an avoided landfill gate fee. Needs market development. Municipality has limited involvement and control.
29	**PSP service: composting.** Composting facilities leased for operation to PSP.	Composting facilities are established by public authorities but operated under service contract by PSP.	Access to expertise. Market based flexible solution. Good control over EHS standards.	May not be feasible without payment of an avoided landfill gate fee. Needs market development.

com	Type	Description	Advantage	Drawback
30	**Micro PSP: composting.** Small-scale community composting by micro-service providers.	Micro-service providers establish and operate small scale decentralised composting facilities. All costs and revenues accrue to the PSP, but may be supplemented by payment of avoided costs of collection and disposal. When treatment is implemented at community level, the members of the community often form cooperatives or other types of joint venture.	Access to private financing. Market based flexible solution. Reduces collection as well as disposal costs. End products may be used locally	Typical operators are CBOs and NGOs, therefore needs capacity building, awareness rising and market development. Municipality has no involvement and control.

Composting revenues come from sale of compost, the revenue collectors are the operators of the facilities. These revenues are often justified against the avoided disposal costs or greenhouse gas emission savings.

Potential revenues from greenhouse gas reduction units are a boost for implementation of composting through any of the models below. Unfortunately, at the time of writing this guidance paper greenhouse gas revenues have significantly declined due to lack of political commitment to the cause in the international scene. This may change again in the future, but such an opportunity will not have a significant influence on choosing any one or the other model for composting, it will simply mean that the operator and the client will have to come together to tap into this source of revenues.

The environmental regulator has an important role in monitoring composting plants, since these are considered significant impact activities and are operating based on environmental permits in most countries.

Incineration

Incineration is a technology usually applied in countries that are very densely populated, and/or where land is scarce and expensive, or there are specific policy drivers in place that make this an attractive solution.

Incineration may or may not result in energy production, depending on the technology chosen and the market demand for energy. Incineration plants are suitable for high calorific, relatively dry waste. In developing countries waste is usually wet and needs to be pre-treated before being suitable for incineration. Also, high calorie dry materials such as various plastics are picked early on in the waste management chain and recycled, thus incinerators may struggle finding sufficient quantity and adequate quality input.

com	Type	Description	Advantage	Drawback
31	**DBO PSP: incineration.** Incineration financed by the public authority, designed constructed and operated by the private sector.	Public sector finances construction of the incinerator, contracting the design, construction and operation to the private sector. Combination of gate fees and feed in tariffs for electricity (or heat) finance the operation and maintenance of the facility.	Good control of gate fees and costs to the users. Technical efficiency; control of EHS elements.	Systems can be very expensive. No access to private investment funds. EHS standards need to be strictly monitored and controlled.
32	**DBFO PSP: incineration.** Incineration financed, constructed and operated by PSP under concession contract with the public authority.	Private sector design, build and finance the construction of incinerators, with guaranteed minimum quantity of municipal waste input and feed in tariffs for electricity (or heat).	Access to investment and expertise. Optimisation of technical design.	Systems can be very expensive. EHS standards need to be strictly monitored and controlled. Little control of gate-fees and costs to the users.

Revenues of incineration plants are from gate fees and sale of heat and electricity if applicable. The revenues are usually paid for by the public authority or the waste management operator but eventually have an impact on the cost to the user whether collected through user charges or taxes.

Being looser on environmental standards may make thermal processing and co-processing of waste more affordable and feasible. Cleaning up the gas to internationally acceptable standards represents 30 – 50% of investment costs and a significant per cent of operational costs for such installations.

The suitability of waste as input to the process should be checked as the composition of waste is different in developing countries as compared to developed countries, availability of spare parts locally and affordability of gate fees are other aspects to evaluate.

Improving disposal

Operation and improvement of disposal sites is generally regarded by the local authority as of secondary importance compared to cleaning the city and modernizing collection services. In any of the operator models below it is important that there is a dedicated budget for disposal operation and it is not intermingled in one common budget for all waste management activities. Otherwise, investing in and maintaining good standards of disposal comes second in importance to collection and sweeping, being a less visible service, and risks being neglected.

com	Type	Description	Advantage	Drawback
33	**Public model: landfill.** Landfill constructed and operated by the public authority.	The public authority finances, develops and operates a landfill site incorporating the necessary engineering and operational measures. Revenues are collected through a gate fee and/or tax.	Experienced operator. Can charge socially affordable gate fee.	No private investment funds attracted. Lack of technical capacity for design and feasibility studies at the public authority. Actual standards may be less than acceptable. Inherently weak monitoring and control.
34	**Public recycling cooperative: landfill.** Landfill constructed and operated by the public authority, cooperative carries out recycling under franchise agreement.	The public authority constructs and operates the landfill, allowing participation of recycling cooperatives to continue to extract and sort recyclables at the site under franchise-type agreement.	Experienced operator; Improved control over informal recycling activities. Can charge socially affordable gate fee.	Actual standards may be less than acceptable. Difficulties in raising technical standards of disposal operations.
35	**PSP service: landfill.** Landfill constructed by the public authority and operated by PSP.	The public authority finances, develops a landfill site incorporating the necessary engineering and environmental protection measures. The operation of the site is contracted out to the private sector.	Relative technical efficiency; public authority has control over the gate-fee.	No private investment funds attracted. Lack of technical capacity for design and feasibility studies at the public authority. The time from project concept to allocating investment financing may be lengthy. Risk of double counting waste handled to increase the payments received from the pubic authority.

com	Type	Description	Advantage	Drawback
36	**DBO PSP: landfill.** Landfill financed by the public authority, designed, contracted and operated by PSP.	The design, construction and operation of the landfill is contracted out to a private company. The investments are from public funds and the public authority retains ownership of the facility. Medium to long-term contract, open bidding process.	Technical efficiency; public authority has control over the gate-fee.	No access to private financing. The time from project concept to allocating investment financing may be lengthy. Risk of double counting waste handled to increase the payments received from the pubic authority.
37	**DBFO PSP: landfill** Landfill designed, built financed and operated by PSP.	The private sector finances, develops and operates a landfill site. Long term contracts for supply of waste to the landfill at a certain gate fee are secured with the public authority(ies). Other permitted wastes are accepted from commercial sources with separately negotiated gate fees. Long term contract to allow recovery of investment, contractor chosen through open bidding procedure.	Technical efficiency; Access to private funds. Investment can be mobilised fast and efficiently.	May be high costs to authority and users. Operators may require guaranteed input amounts and increase of gate-fee over time.

Financing of operation for landfills or disposal sites is rarely from user charges and more commonly from public authority budgets. Sometimes there is a gate fee at the disposal site, this covers at least the cost of operation in case there is private sector participation in the operation of the landfill.

The improvement of standards in one big step usually is connected to national policy implementation or development financing or both. It is of major importance to keep the local authorities involved in the design of such facilities to ensure that they are acceptable to the local citizens and operate at reasonable cost.

There are many cases where residents living nearby landfill sites will protest, especially if there has been no or insufficient consultations during the planning process, and/or economic/financial mechanisms put in place which enable the local communities to benefit.

Landfill sites should be closely monitored by the environmental authorities, being facilities with significant potential environmental impact.

Integrated services

We have collected here the models that are at a considerable level of integration, not merely combining two elements of the waste management chain but three or more or all.

com	Type	Description	Advantage	Drawback
38	**Integrated public service.** All service elements combined into one, provided by the public authority or enterprise.	Full integration of the collection and treatment/disposal service elements with the public authority or enterprise performing the entire service.	Experienced operator in sweeping, collection and disposal. Single source accountability for service performance. Interfaces between different parts of the service chain are clear.	The public operator may lack expertise in recycling, composting and treatment activities. Inherently weak monitoring, control, and financial management. The time from project concept to allocating investment financing may be lengthy.
39	**Integrated PSP concession:** All service elements combined into one, with investment financing, construction and operation by the PSP.	Full integration of the collection and treatment/disposal service elements, contracting out to the private sector. The contractor is required to finance, construct and operate facilities/services and is paid a price per tonne of municipal waste.	Allows for an integrated management of the service. Less management effort on the side of the public authority, as it needs to deal with one bidding process, one operator.	Heavy reliance on one operator. The operator may lack expertise in one or the other aspect of waste management. May not be sufficiently demand responsive to citizens needs. Long-term engagement that may chain the city to solutions that may not fulfil changing requirements in the long run.
40	**Integrated PSP.** Integrated waste management combining all service elements into one, provided through joint venture PSP.	Full integration of the collection and treatment/disposal service elements through a joint venture with a private company. The public authority provides financial guarantees, and often also staff, and the private partner manages the service and brings in investment for the construction/upgrading of service and facilities.	Allows for an integrated management of the service. More control over operations from the public authority.	Heavy reliance on one operator. The operator may lack expertise in one or the other aspect of waste management. More involvement in the day- to-day operations delivery and management is needed from the side of the public authority. Long-term engagement that may not fulfil changing requirements in the long run.

com	Type	Description	Advantage	Drawback
41	**Public model: integrated resource recovery.** Public authority develops and operates an integrated resource recovery facility.	The public authority develops and operates an integrated resource recovery facility combining different mechanical, biological and thermal treatment processes.	Potential to generate revenues to partly offset the net costs of treatment.	Inexperienced operator; inherently weak monitoring and control. Lack of attention to product/output quality may lead to costly system. The time from project concept to allocating investment financing may be lengthy.
42	**PSP: integrated resource recovery.** Integrated resource recovery facility provided by PSP under concession or service contract.	The private service provider develops and operates an integrated resource recovery facility combining different mechanical, biological and thermal treatment processes. The public authority usually pays a gate fee.	Technical efficiency. Access to investment and expertise. Market-oriented operation. Ability to mobilize investment funds quickly and efficiently.	May be costly. EHS performance needs strict monitoring. Increased risk of economic influence.

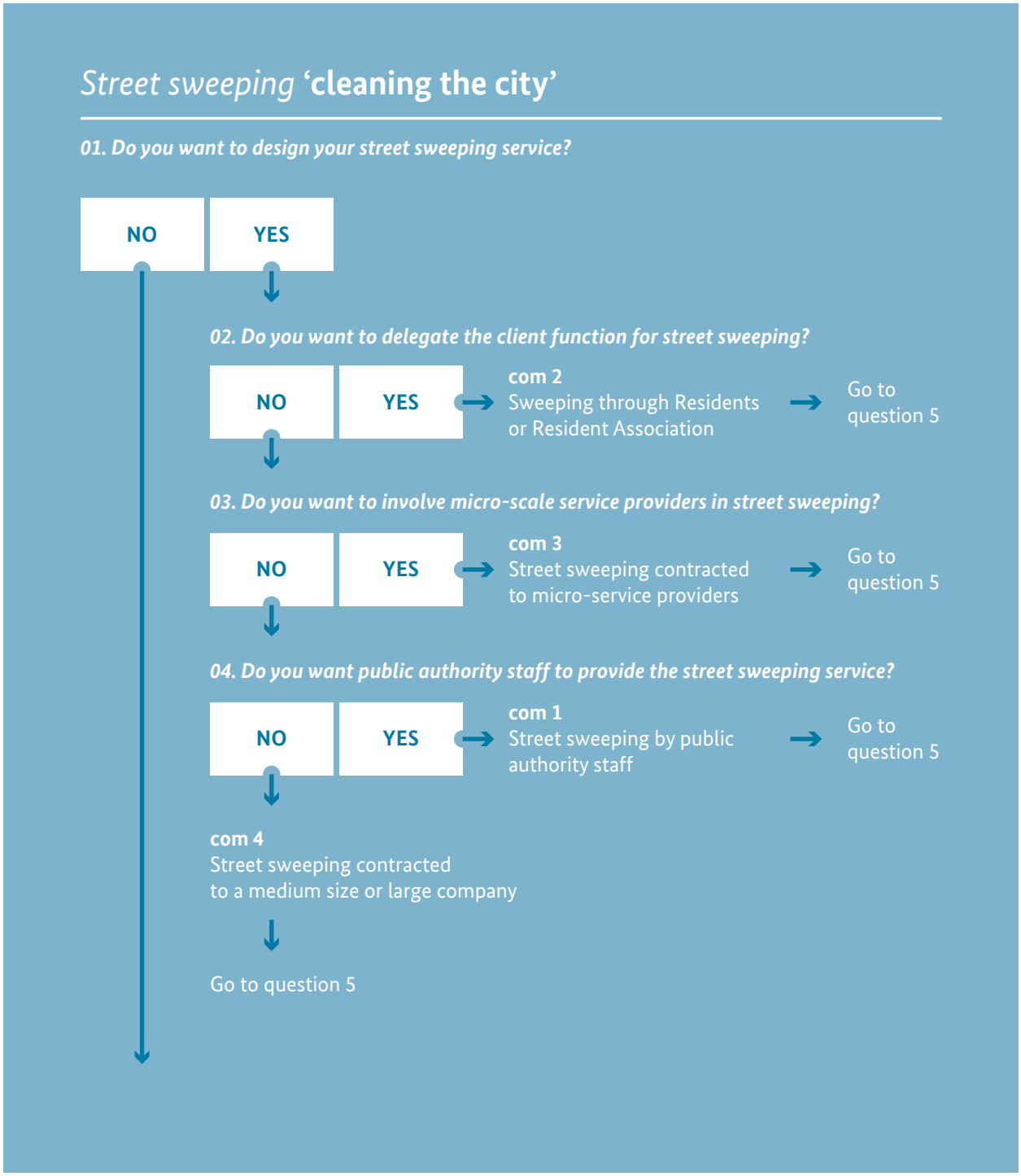
The financing of integrated services is through local taxes, user charges or a combination of these. Other revenues may come from the sale of recyclables, compost or energy, depending on the activities foreseen in the integrated model. The revenue collector may be the public authority, operator or a third party, such as a utility company.

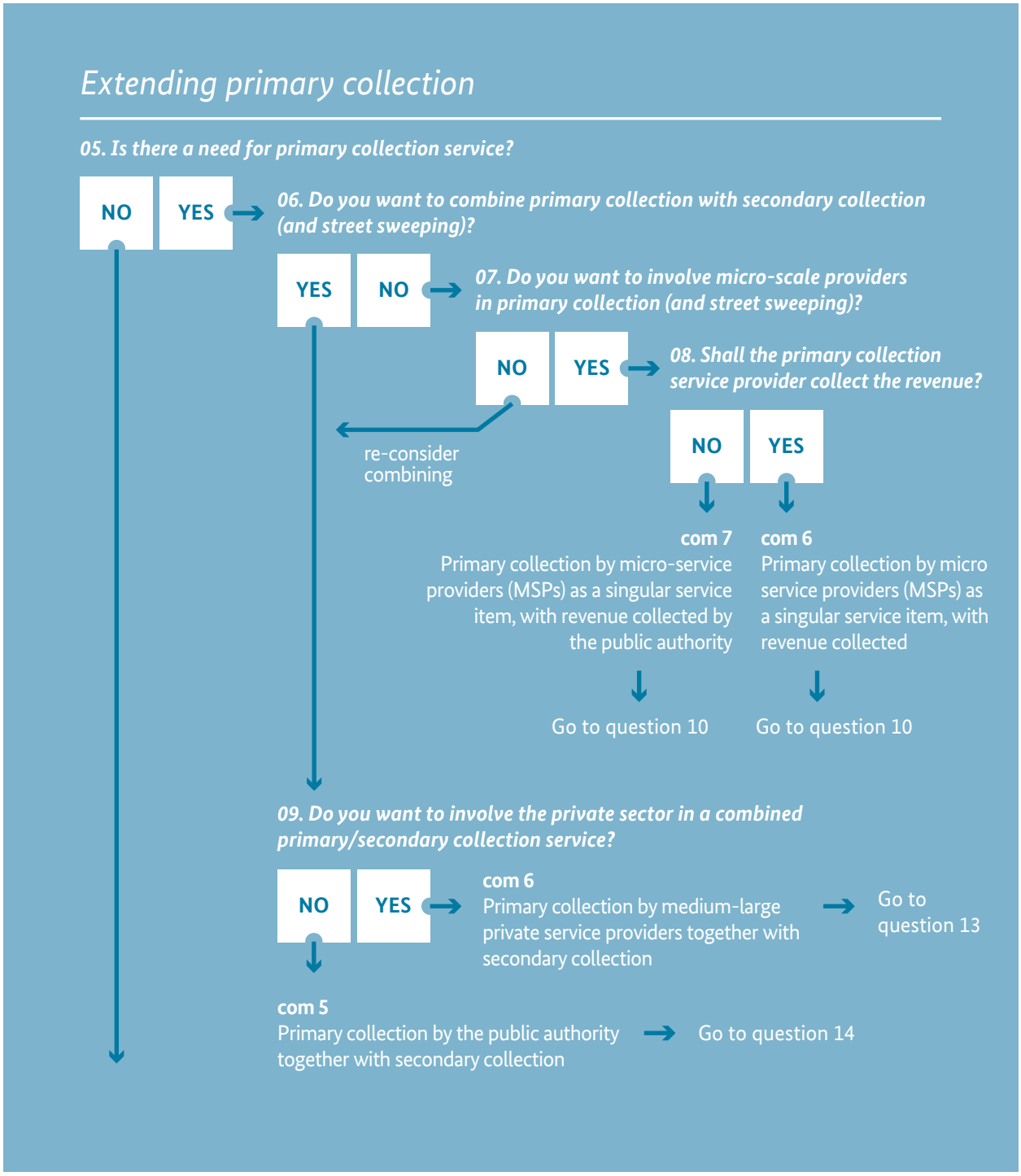
Local authorities regularly receive offers for the construction and/or operation of treatment or refuse derived fuel (RDF) production or thermal processing or co-processing facilities for waste. These offers often come uninvited from the private sector and may induce the local authority in error to pursue such a project in absence of a rigorous, and independent, feasibility study.

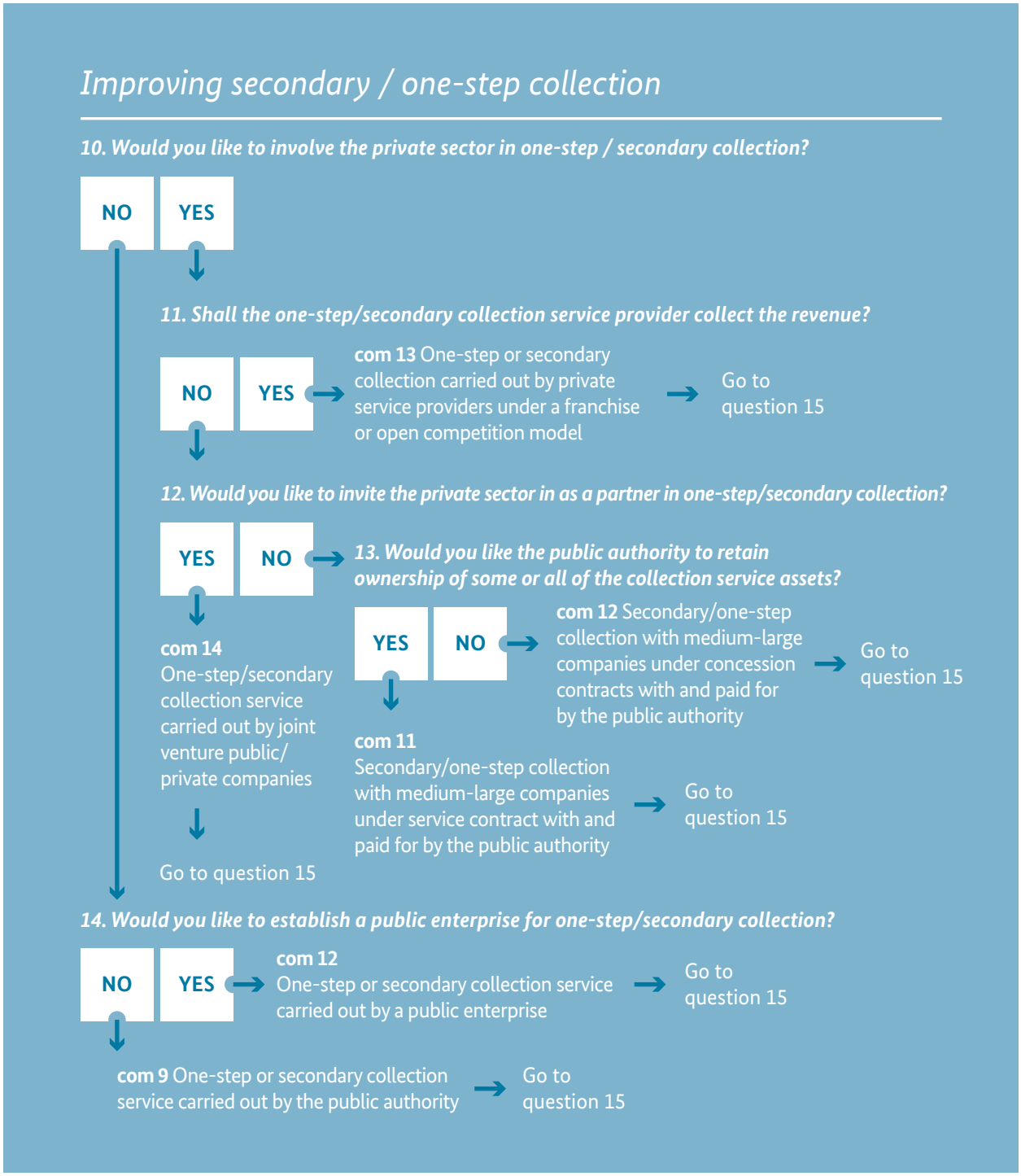
With these facilities, investments are high and so is the risk of economic influence and the incentive to engage in to corrupt practices. Unsolicited proposals should be carefully assessed in terms of the technology's reliability and applicability to developing countries as well as the cost implications of such projects to the citizens. On the other hand with the advancement of treatment technologies and increased pricing or taxing introduced for landfills, the example of treatment facility charging no gate-fee may become more frequent.

When thinking about integrated treatment facilities, it's best for the municipality to decide independently what they want, to hire staff or specialized consultant services to write out a tender that best complies with the local needs, objectives and resources, rather than to respond to *ad hoc* proposals. The tenders could specify the need to treat different waste streams and the technology to be applied.

Annex B: Design your ISWM system - *coms* tool




Extending primary collection
05. Is there a need for primary collection service?
NO
YES
06. Do you want to combine primary collection with secondary collection (and street sweeping)?
YES
NO
07. Do you want to involve micro-scale providers in primary collection (and street sweeping)?
NO
YES
08. Shall the primary collection service provider collect the revenue?
re-consider combining
NO
YES
com 7
Primary collection by micro-service providers (MSPs) as a singular service item, with revenue collected by the public authority
Go to question 10
com 6
Primary collection by micro service providers (MSPs) as a singular service item, with revenue collected
Go to question 10
09. Do you want to involve the private sector in a combined primary/secondary collection service?
NO
YES
com 6
Primary collection by medium-large private service providers together with secondary collection
Go to question 13
com 5
Primary collection by the public authority together with secondary collection
Go to question 14


Improving secondary / one-step collection
10. Would you like to involve the private sector in one-step / secondary collection?
NO
YES
11. Shall the one-step/secondary collection service provider collect the revenue?
NO
YES
com 13 One-step or secondary collection carried out by private service providers under a franchise or open competition model
Go to question 15
12. Would you like to invite the private sector in as a partner in one-step/secondary collection?
YES
NO
13. Would you like the public authority to retain ownership of some or all of the collection service assets?
com 14 One-step/secondary collection service carried out by joint venture public/ private companies
Go to question 15
YES
NO
com 12 Secondary/one-step collection with medium-large companies under concession contracts with and paid for by the public authority
Go to question 15
com 11 Secondary/one-step collection with medium-large companies under service contract with and paid for by the public authority
Go to question 15
14. Would you like to establish a public enterprise for one-step/secondary collection?
NO
YES
com 12 One-step or secondary collection service carried out by a public enterprise
Go to question 15
com 9 One-step or secondary collection service carried out by the public authority
Go to question 15

Commercial waste collection

15. Would you like to integrate the commercial waste collection service with the household waste collection service?

NO

com 17
Commercial waste collection by private service providers under open competition model → Go to question 17

YES

16. Would you like to involve the private sector in commercial waste collection?

YES

com 16
Commercial waste collection carried out by the designated PSP → Go to question 17

NO

com 15
Commercial waste collection services carried out by the public authority → Go to question 17

Transfer services

17. Do you need transfer station(s)?

NO

YES

18. Would you like to involve the private sector in transfer services?

NO

YES

19. Would you like the public authority to retain ownership of some or all of the transfer service assets?

NO

YES → **com 19** Transfer services provided by PSP under service contract with and paid by the public authority → Go to question 20

com 20 Transfer investment and services by PSP under concession contract with and paid by the public authority → Go to question 20

com 18 Transfer by public authority or enterprise → Go to question 20

Recycling

20. Do you have an extended producer responsibility (or product stewardship) in place?

NO **YES** → ***21. Will the system be organised and financed by the producers of goods?***

NO **YES** → **com 25** Client and revenue collector functions delegated to extended producer responsibility organisations set up and managed by producers, importers and distributors of goods → Go to question 22

com 26 Client and revenue collector functions delegated to extended producer responsibility organisations set up and managed by public authorities → Go to question 22

22. Do you have an active informal recycling sector?

NO **YES** → ***23. Do you wish to formalise the role of informal recycling sector?***

YES **NO** → **com 24** Collection and sorting of recyclables by the private sector (informal/formal) in open competition → Go to question 26

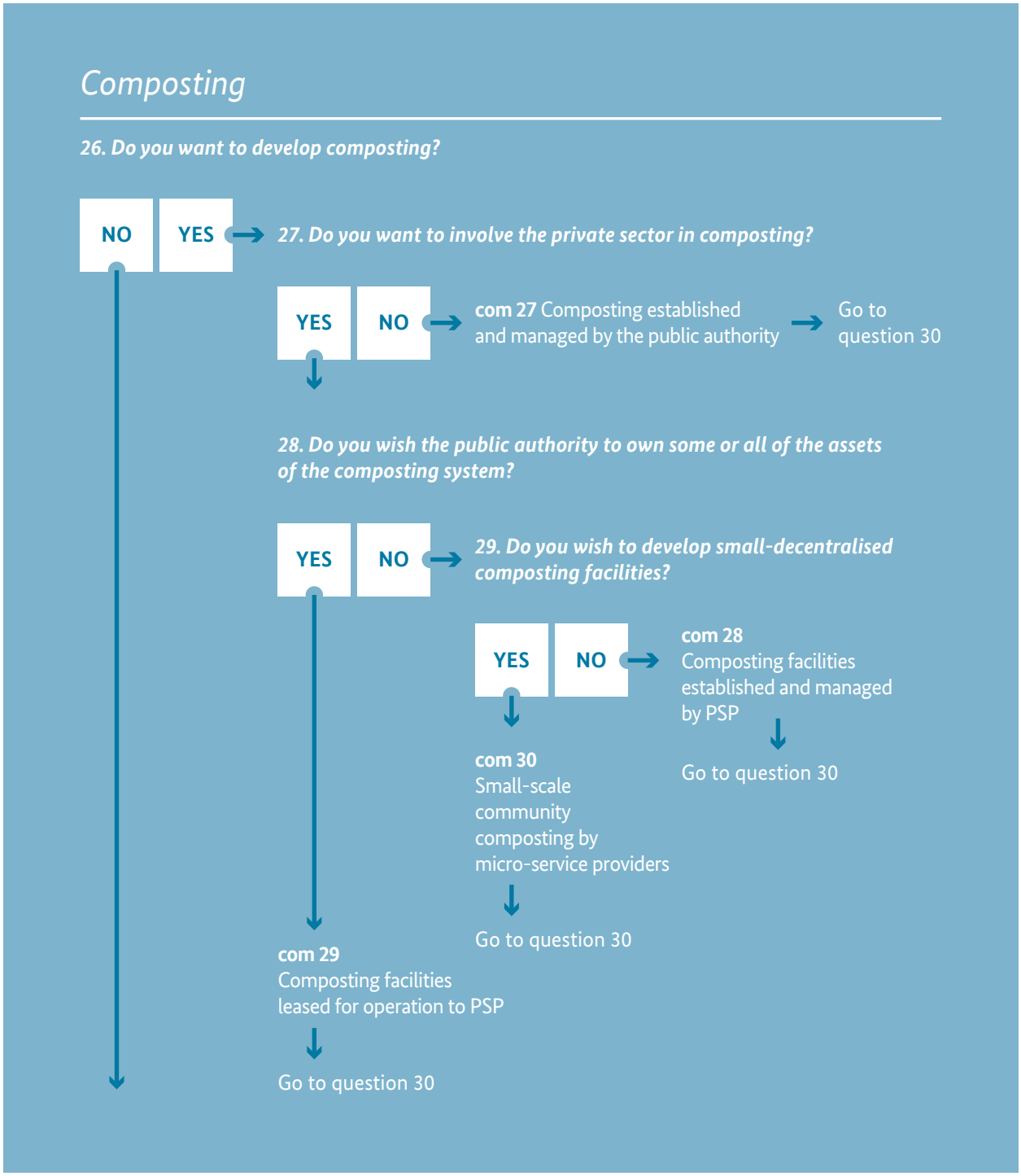
24. Do you wish the public authority to own some or all of the assets of the recycling system?

YES **NO** → **com 23** Collection and sorting of recyclables by the private sector under franchise contract with the public authority → Go to question 26

25. Do you want to involve the private sector in the collection system for recyclables?

NO **YES** → **com 22** Collection of recyclables by the private sector under contract with the public authority → Go to question 26

com 21 Collection and sorting of recyclables by the public authority or enterprises → Go to question 26


Composting
26. Do you want to develop composting?
NO
YES
27. Do you want to involve the private sector in composting?
YES
NO
com 27 Composting established and managed by the public authority
Go to question 30
28. Do you wish the public authority to own some or all of the assets of the composting system?
YES
NO
29. Do you wish to develop small-decentralised composting facilities?
YES
NO
com 28 Composting facilities established and managed by PSP
Go to question 30
com 30 Small-scale community composting by micro-service providers
Go to question 30
com 29 Composting facilities leased for operation to PSP
Go to question 30

Incineration

30. Do you want to develop incineration facilities?

NO

YES

31. Do you want the public authority to retain the ownership of the incineration facility assets?

NO

YES

com 31
Incineration financed by the public authority, designed, constructed and operated by the private sector

Go to question 32

com 32
Incineration financed, constructed and operated by PSP under concession contract with the public sector

Go to question 32

Landfilling

32. Do you wish to construct or improve a landfill?

NO

YES → ***33. Do you wish the public authority to retain the ownership of the landfill assets?***

YES

NO → **com 37** Landfill designed, built, financed and operated by PSP → Go to question 38

34. Do you have informal recyclers on the existing landfill?

NO

YES → ***35. Do you wish to formalise the recycling activities on the landfill site?***

NO

YES → **com 34** Landfill constructed and operated by the public authority, cooperative carries out recycling under franchise agreement → Go to question 38

36. Do you wish to contract out the operations of the landfill?

YES

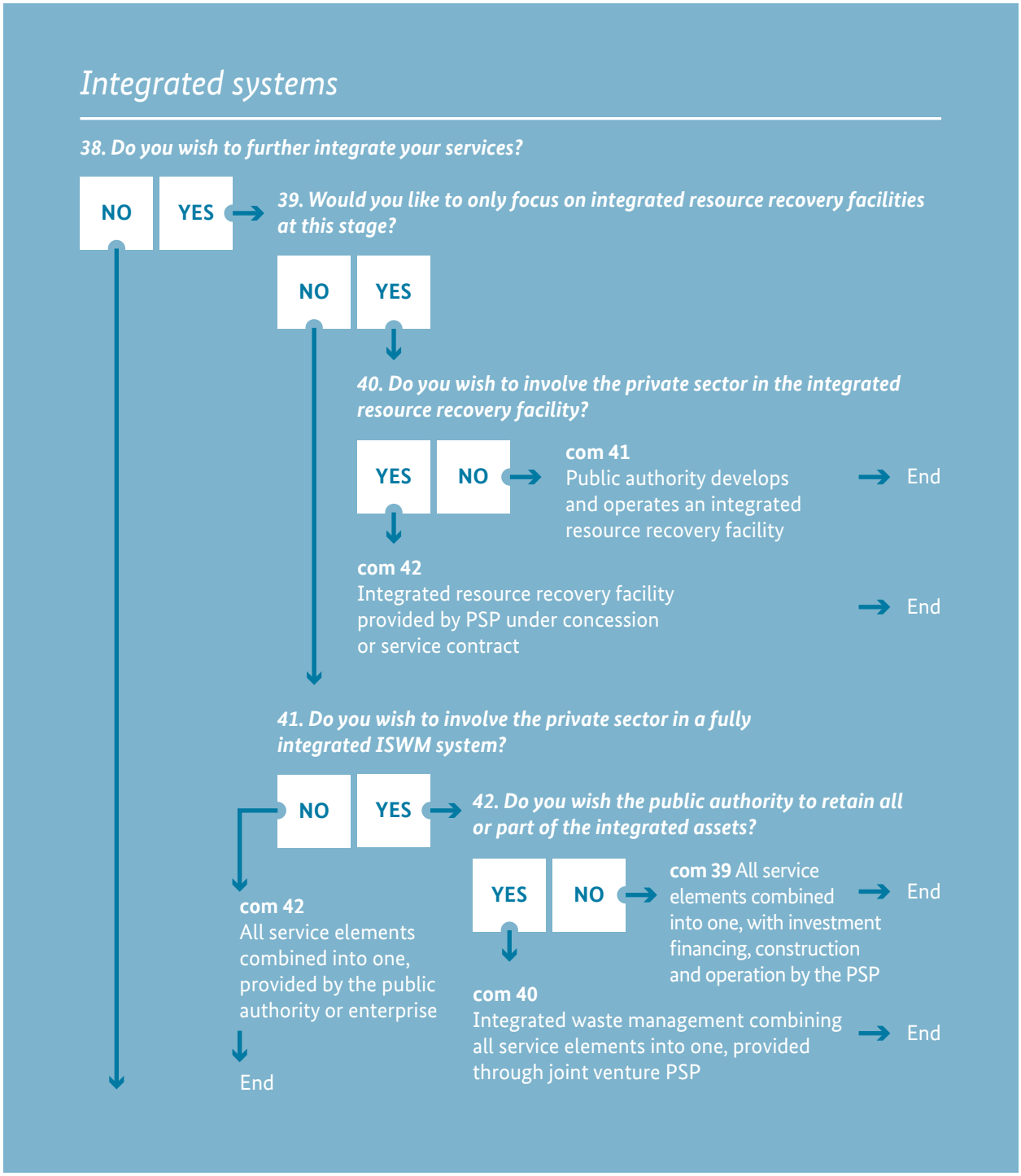
NO → **com 33** Landfill constructed and operated by the public authority → Go to question 38

37. Do you wish the operator of the landfill to also design and construct the facility?

YES

NO → **com 35** Landfill constructed by the public authority and operated by PSP → Go to question 38

com 35 Landfill financed by the public authority, designed, contracted and operated by PSP → Go to question 38


Integrated systems
38. Do you wish to further integrate your services?
NO
YES
39. Would you like to only focus on integrated resource recovery facilities at this stage?
NO
YES
40. Do you wish to involve the private sector in the integrated resource recovery facility?
YES
NO
com 41
Public authority develops and operates an integrated resource recovery facility
End
com 42
Integrated resource recovery facility provided by PSP under concession or service contract
End
41. Do you wish to involve the private sector in a fully integrated ISWM system?
NO
YES
42. Do you wish the public authority to retain all or part of the integrated assets?
YES
NO
com 39 All service elements combined into one, with investment financing, construction and operation by the PSP
End
com 40
Integrated waste management combining all service elements into one, provided through joint venture PSP
End
com 42
All service elements combined into one, provided by the public authority or enterprise
End

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