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**Practical Guidebook on Strategic Planning
in Municipal Waste Management**

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Disclaimer

This guidebook was written by Dr. Dariusz Kobus, a consultant commissioned by the World Bank. Peer review and technical input were provided by Carl R. Bartone. The final review for completeness and correctness was provided by Sandra Cointreau, waste management consultant to the World Bank.

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Cities of Change - A Network of Municipalities in Central and Eastern Europe

A huge agenda has been downloaded onto local authorities despite national governments often retaining control of assets and revenues. Financial resources available to local governments are extremely tight, and the transfers from central budgets are often unreliable. Furthermore, legalistic public administration procedures are still largely in place and community involvement and public participation is normally not part of local government decision-making procedures.

A strategic approach to management that will make local governments more effective and efficient is one of the most pressing needs in the transformation of public administration in Central and Eastern Europe.

The **Bertelsmann Foundation** and the **World Bank** have jointly initiated and established a network of selected municipal authorities to support policy and administration reform in the region. This network is designed to foster a constructive, informal, cross-border dialogue between local governments from five Central and Eastern European countries on key topics of organisational, political, social and economic reform. Officials can improve their ability to create the right environment for individuals, communities and businesses in order to thrive and respond to the changes wrought by the introduction of market forces. Cities can be the engines of growth not only for their communities but also for their countries. The joint establishment of this unique network is designed to tackle change from the local government perspective.

The network-structure is modelled on “Cities of Tomorrow” (www.cities-of-tomorrow.net), a programme which the Bertelsmann Foundation has supported in OECD countries for a number of years.

On the basis of clearly defined criteria, the World Bank and the Bertelsmann Foundation carried out a selection process to determine which cities should participate in the network. The selection was made from medium-sized cities in Poland, Hungary, Slovakia, Latvia and Bulgaria. This network of **eight reform-oriented local governments from the five countries** is supposed to act as a **Laboratory for Innovation and Change**. Its foremost aim is to help the cities develop a long-term strategy and assist in the implementation of strategic planning for certain key issues. The cities themselves had ranked the topics of local economic development and solid waste management/municipal environmental strategy as top priorities. Work on these topics is undertaken in two clusters. The intention of the cluster work is to encourage the cities to meet challenges in the specific fields of activities by using the following strategic management approach:



By providing a forum for the exchange of ideas and experience on local government reform and successful strategies, the transformation process from central planning to markets is supported by the Cities of Change network. The network also helps to produce model solutions for the challenges which the participating cities are facing and is an inspiration to the process of reform and urban development in the region. The cities test and implement new ideas gained through the activities of the project. The results are widely disseminated.

Table of Content

Table of Content.....	3
Executive Summary	4
Glossary of Terms	7
1 Purpose of the Guidebook	9
2 Strategic Planning Cycle Applicable to Waste Management.....	11
3 Before You Start.....	14
3.1 What is Needed to Proceed?	14
3.2 Participatory or Expert Approach?	16
3.3 Centralised or Decentralised Approach?	19
3.4 EU Waste Legislation	20
4 How to Make it Happen? Preparatory Phase.....	23
4.1 Setting the Project and the Stakeholder Process	23
4.2 Gathering Information	24
4.3 Preparing Status Report	26
5 How to Make it Happen? Strategic Phase.....	27
5.1 Identifying Problems.....	27
5.2 Generating Objectives to Address Problems	28
5.3 Prioritising Objectives	28
5.4 Generating Alternative Scenarios to Achieve Strategic Objectives.....	35
5.5 Appraisal of Alternative Scenarios	37
5.6 Selection of Scenario and Drafting of Strategy	40
6 How to Make it Happen? Final Phase	41
6.1 Drafting of Long-Term Strategy Document and Short-Term Action Plan.....	41
6.2 Preparation of Financial Plan.....	43
6.3 Implementation, Monitoring and Evaluation.....	44
7 Concluding Remarks.....	47
 APPENDIX 1: Bibliography and Recommended Further Reading.....	 50
APPENDIX 2: Sample Questionnaire Survey Exploring Citizens' Satisfaction with the Municipal System.....	51
APPENDIX 3: EU Waste Management Legislation.....	58
APPENDIX 4: Exercise on the Selection of Waste Management Scenario	72
APPENDIX 5: Case Study of Graz.....	75
APPENDIX 6: Case Study of Pamplona	77
APPENDIX 7: Case Study of Pazardjik - Development of a Solid Waste Management Strategy.....	79

Executive Summary

The guidebook provides assistance to local governments in Central and Eastern Europe (CEE), with special emphasis on the EU accession countries, on how to develop cost-effective waste management systems using a methodical, step-by-step strategic planning approach, and on how to set priorities in the waste management area. The guidebook highlights the EU requirements for waste management that cities in Central and Eastern Europe will have to comply with in the short to medium term.

Because appropriate waste management systems require costly investments and because many local governments in CEE depend on external, international funding sources, a strategic approach to planning and project preparation is often a precondition for financing, as well as for a successful and sustainable waste management system. The approach outlined in this guidebook shall assist local governments to organise, implement and monitor strategic planning for their waste management needs.

The guidebook describes an iterative planning process consisting of the following main stages:

- identifying problems and needs, based on an assessment of the existing situation;
- generating and weighting objectives;
- elaborating potential actions to meet the objectives identified;
- preparing scenarios that address alternative futures in, for example, service delivery, resource recovery, cost recovery and financial sustainability;
- comparing each scenario's environmental impact, mitigating measures, costs, and constraints; and examining stakeholders' willingness to pay for and co-operate with the alternative scenarios;
- adjusting and re-examining scenarios;
- developing and reaching consensus on both selection criteria and the choice among scenarios that best addresses stakeholder problems, needs, and objectives, as well as willingness and ability to pay;
- preparing concrete action plans, detailed cost analysis and financing requirements, as well as options for financing;
- appraising finances, negotiating for borrowing or private participation and developing implementation agreements;
- monitoring and evaluating the strategy, eventually reformulating and updating the strategies for the future.

This guidebook leads solid waste planners and stakeholders through the strategic planning process. It provides methods and instruments to develop objectives, data input, scenarios, and action plans for implementation. The guidebook also suggests how best to assign responsibilities for various elements of the planning among local government officials, external waste management experts, interested stakeholders and representatives of the community. Readers should note that the complex issue of site selection, project siting, and permitting is not tackled in this guidebook.

The guidebook is based on a participatory approach to planning. Although potential problems related to participatory planning are discussed, the guidebook strongly recommends involving the community in the planning process. Some advantages of the participatory process are that it taps into the knowledge and creative ideas of various stakeholder groups, enhances creative dialogue on options and issues, and lays the foundation for consensus. Participation typically brings heightened commitment of all participating groups to the selected plan, and also to any related cost recovery requirements. Participatory planning typically minimises public opposition, often referred to as the NIMBY ('not in my back yard') syndrome. As an added benefit, a project proposal based on a participatory and strategic planning process is more likely to attract support for funding from international agencies.

The step-by-step approach to strategic planning described in this guidebook indicates the data needed for proper assessment of the status quo, suggests potential stakeholder groups to involve in developing the strategy and outlines their potential contribution. Organisational requirements and methods to structure co-operation with the stakeholder groups, as well as the expected outputs from participatory planning are described in detail. Special emphasis is put on generating objectives and setting priorities among them, as well as on the instruments for identifying problems and the causal relationships among them. Defining criteria for setting priorities, as well as weighting and scoring systems in a participatory process, allows goals to be set transparently and objectively. Based on these goals, both potential single actions and complete waste management scenarios can be generated with contributions from stakeholders.

This guidebook recognises the importance of interactions between experts and stakeholders. For most steps, the experts should take a leading role. Commonly, for instance, experts should generate and compile data, develop scenarios, analyse costs, and assess environmental impact. Stakeholders are expected to help in defining objectives, planning criteria, and site selection criteria; ranking scenarios and sites; confirming compliance with national legislation (reflecting EU standards); providing their concerns about environmental impact; and ensuring that proposed environmental mitigation measures likely will satisfy their concerns. The proof of a successful strategic planning process comes when the selection of a scenario largely satisfies both the experts and the stakeholders.

Based on this step-by-step approach, a strategic plan will contain the following elements:

- description of the study area;
- description of existing conditions, problems and needs;
- approved planning objectives, priorities, and resolution time horizons;
- description of possible scenarios, their costs, environmental analysis and other appraisal results;
- recommendation of the preferred scenario, including the justification of the decision;
- list of actions to implement the strategy, including any design, siting, utility arrangements, procurement steps, or other implementation requirements;

- list of related arrangements that will enable the strategy implemented to be sustainable, including any institutional, organisational, regulatory, monitoring, financial, public co-operation, private sector arrangements, and/or conditions needed to realise the strategy.

It is important to monitor whether implementing the strategy really achieves the expected outcomes. Therefore, appropriate indicators need to be identified and monitored for criteria such as timing and expenditures; environmental, social and economic impact; household and community participation; resource recovery and waste recycling; occupational health and safety improvement; improved service delivery; and increased revenue generation. For the monitoring to be meaningful, baseline data on the criteria must be collected before the strategy is implemented.

Monitoring should not be restricted to the implementation phase, but rather reviewed regularly during operations. The continuous strategic planning process is, ideally, a cyclic process that requires regular adjustments to strategy, objectives and actions. A cyclic review enables flexible responses to challenges that arise, whether these changes result from the managing team's own efforts or external conditions, and helps to achieve continuous improvement.

Glossary of Terms

Calorific value: The quantity of heat generated when a unit mass of a material undergoes complete combustion under certain specified conditions. It is expressed in kilojoules (kJ) or kilocalories (kcal) per kilogram of waste. The higher (or gross) calorific value represents the value for oven-dried waste, and the lower (or net) value represents the value for raw as-received wet waste.

Capital cost: Investment cost including items such as land, site development, infrastructure, plant and equipment, and financing.

Cost recovery: Recovering the cost of municipal solid waste management, or other municipal services from the users. Cost recovery may be by direct or indirect charges. Direct charges may be user fees collected from each waste generator or each community. Indirect charges may be property taxes, central government transfers to local governments, environmental taxes, business licenses, and/or sanctions for illegal dumping.

Dumpsite: An official dumpsite is one located by a local government for solid waste disposal without measures to minimise environmental pollution or limit slope instability. A dumpsite typically lacks compaction and soil cover on any routine basis. It may have periodic spreading and grading to keep the access way open for trucks to unload. Certainly, no engineered measures to control leachate or landfill gas are provided. Many dumpsites have open burning. An unofficial disposal site is referred to as a clandestine dumpsite, and would not even have periodic spreading and grading.

EU Directives: European Union (EU) legislation that the member EU states are required to adopt in their national legislation.

NIMBY: An acronym that stands for 'not in my back yard'. It reflects the attitude of many local residents who oppose the location of any new facility, whether or not there will be significant potentially adverse environmental impacts in their vicinity, even if construction of such facility is in the public interest.

Operating costs: Day-to-day expenses of an operation, and the supervision and monitoring of such operation. They include items such as labour, personnel benefits and administrative overhead, fuel and other equipment consumables, chemicals, utilities, repairs and maintenance, and insurance.

Polluter Pays Principle: An environmental policy principle that requires polluters (e.g. waste generators) to bear all costs associated with proper collection, treatment, and disposal of their wastes, including all costs associated with negative environmental impacts of their activities, so that these costs are not eventually covered by the affected parties or by the government.

Sanitary landfill: Sanitary landfill is a method of final disposal of waste in covered cells and layers, sited and designed to meet technical requirements that minimise all forms of nuisance and pollution related to traffic, noise, odour, gaseous emissions, contaminated surface runoff, leachate, bioaerosols, particulates, and adverse aesthetics. Typical controls involve landfill gas collection and ventilation, leachate collection and treatment, base lining to protect the groundwater, site fencing and entry control to restrict access of animals and waste pickers, gate control to restrict hazardous waste entry, fire protection, surface grading to limit slope instability while enhancing drainage, and waste compaction and soil cover to limit infiltration from precipitation.

Stakeholders: Persons, groups or institutions with specific interest in certain types of projects or activities, including environmental groups, social and livelihood groups, labour unions, religious organisations, ethnic groups, universities and farmers. Also, persons, groups or institutions that will be affected by a proposed project or activity (positively or negatively), particularly those in the immediate service area or siting area of a project. This could include those who will not be affected but think that they will be.

Subsidiarity principle: Principle requiring decisions to be taken at the lowest feasible administrative level.

Targeted funding: Funding that is not secured but for which the proposed project meets all conditions and/or priorities of a proposed funding source, or for which potential funding sources have expressed interest in funding the project. Hence, there is a likelihood that funding will be secured in the future.

Total cost: Includes both capital and operating costs, shows all hidden and subsidised costs (such as benefits, pensions, administration, insurance, registration, taxes, maintenance, profit), and takes into account depreciation and amortisation.

Transfer station: A facility at which solid waste loads from smaller collection vehicles are aggregated for long distance haul into larger vehicles or other transport means (such as rail cars or barges) to enable economical haul to more remote disposal or treatment sites.

Unit cost: Unit cost refers to the total cost divided by the number of metric tonnes or the number of cubic metres. For example, the unit cost of collection is the cost of collecting one tonne or one cubic metre of waste. The calculation should include all costs, including amortisation of capital costs, social benefits and overheads. Financial comparisons of different systems should compare unit costs.

Willingness to pay: Reflects the payment an individual or community is both willing and able to contribute regularly for a particular service or related benefit. Citizens may be unwilling to pay a required fee (even if able to do so) if they feel that the organisation to be paid should not be supported because it is inadequate or that the service to be provided is unnecessary or unsuitable.

1 Purpose of the Guidebook

Solid waste management is a complex and challenging task for city governments. The quantity of solid waste is significantly increasing in all Central and Eastern European (CEE) countries as their economic development improves and their urban populations grow sharply. Yet, funds to cope with collection and disposal needs are seriously constrained. Most wastes in CEE countries are inadequately managed. Wastes often are discarded illegally, the NIMBY¹ factor creates difficulties for siting new waste facilities and existing facilities seldom meet modern environmental protection standards.

Managing solid waste requires costly infrastructure and capital investment, and involvement of various stakeholders², particularly local communities if recycling is to be introduced or expanded. Solid waste systems must address evolving waste legislation (including stricter standards) and economic instruments introduced by governments (landfill tax, refund schemes). Managing solid waste is operation intensive, and often labour intensive, thus resulting in high operating costs, particularly for the collection system. There are many choices to be made: choice of waste treatment and disposal facilities, choice of technology, choice of collection system, choice of contractual arrangement, etc. Moreover, the choices should be most cost-effective in the longer term. Yet there are no universal models that could be copied and applied.

The Central and Eastern European countries (CEECs) face a complex and costly task of implementing EU environmental requirements. In terms of investment, waste management, alongside wastewater treatment, is one of the 'investment heaviest' environmental sectors for the CEECs. Consequently, the strategic planning for waste management was selected as topic for five CEE cities participating in the Cities of Change (CoC) project³. This guidebook is one of the CoC project's knowledge products based on the methodology and instruments developed to build institutional capacity in the participating cities. This guidebook is targeted primarily toward the CEE countries that are approaching EU membership, are at the upper-middle income level, plan to gradually phase in EU waste management requirements, and are consequently eligible for EU assistance funding to cover a majority of the high cost of new environmentally-acceptable facilities. Generally, the methodology presented in the guidebook can be applied also to the low-income countries of Eastern Europe and the Balkans that are not currently accession candidates. However, certain parts of the guidebook may not be quite appropriate for their particular situations, or their financial and institutional capacities.

¹ NIMBY stands for 'not in my backyard'. It reflects the opposition of any local residents to location of any new facility with potentially adverse environmental impacts in their vicinity, even though construction of such a facility is in the public interest.

² Person, group or institution with interest, often but not always financial, in a project or programme.

³ The project Cities of Change is co-financed by the World Bank and the Bertelsmann Foundation. It is supporting eight CEE cities in applying strategic planning to economic development and waste management, and it facilitates communication and exchange of experience among the participating cities.

The most effective way to address waste management challenges and make appropriate sustainable choices is to develop and implement a waste management strategy. This guidebook provides practical advice on how solid waste management strategy can be developed and implemented at the city level. It introduces the concept of strategic planning for municipal solid waste management. It describes the process and the outputs of strategic planning, points out what is needed to proceed and guides the reader through the process in a practical, step-by-step approach. The guidebook also contains straightforward exercises to illustrate the concepts presented and to demonstrate how they can be addressed in a participatory stakeholder process. However, the guidebook does not address the issues of project preparation and appraisal, or siting procedures for new landfill sites or incinerators.

The guidebook is intended to assist cities in better understanding how to develop and implement waste management strategy. It is expected that at the end of this guidebook a reader will:

- understand the concept of strategic planning for municipal solid waste management;
- understand what is needed to develop a municipal waste management strategy;
- understand the potential advantages and disadvantages of a participatory stakeholder approach;
- understand how to organise and manage the different stages of the strategic planning process.

2 Strategic Planning Cycle Applicable to Waste Management

Strategic planning is a cyclic process. The main components of strategic planning include: identifying problems based on an analysis of the existing situation, generating objectives to address the problems, appraising and objectives setting priorities among them, generating actions that support each objective, appraising actions, preparing a detailed action plan that includes financial plans, and finally monitoring and evaluating progress to provide feedback for modification and improvement. Modifications can be introduced to this general methodology depending on the specific conditions and needs of the user.

Figure 1 presents a strategic planning cycle adopted for preparing a solid waste management strategy. The modifications to the general strategic planning methodology for waste management relate to the need to forecast the future waste stream while simultaneously preparing the status report. This affects development and appraisal of alternative waste management scenarios.

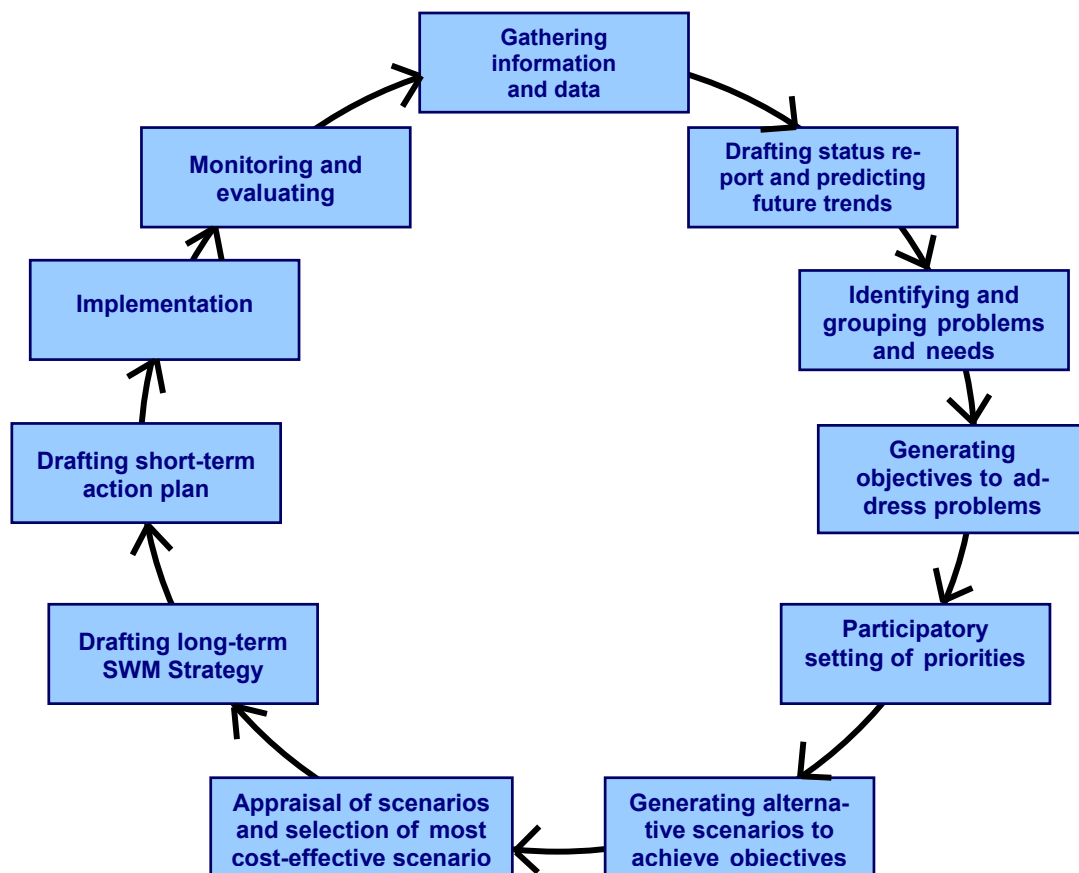
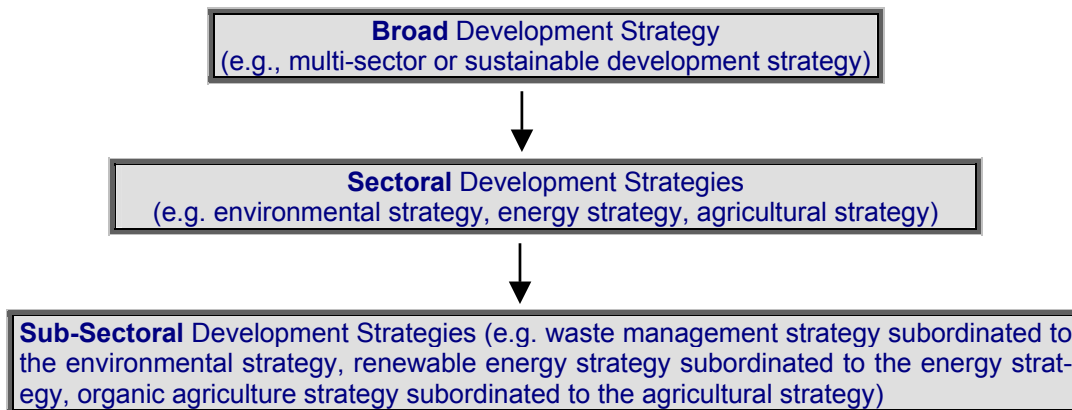


Figure 1. View of Strategic Planning Cycle for Solid Waste Management

The key product or output of strategic planning is a strategy. There are various tiers and purposes for which strategies can be developed. We can generally distinguish among:



For this guidebook, the output of the strategic planning process is a waste management strategy (WMS). A WMS can be applied at the national, regional or local level. A WMS can deal with all types of waste, or it can address only certain types of waste such as hazardous waste, household waste or construction and demolition waste. A holistic strategy should deal with all parts of the solid waste system including collection, recycling, transfer, treatment, disposal, cost recovery and private sector involvement).

Waste management strategies ideally would be undertaken hierarchically. First, the national strategy would be developed, followed by a regional strategy and finally by metropolitan, municipal or district strategies. The national policies, regulatory instruments and funding priorities would thus be reflected in the regional WMS, and these in turn would be reflected in district or municipal WMS (Polish example see Example 1). Consultation with and feedback from the regional level would be necessary during preparation of the national WMS. Similarly, participation of the local level would be essential in developing regional strategies. It is more common for strategies to be conducted at the local, i.e. municipal or metropolitan, level for most wastes.

The Polish Waste Act, in force since 1 October 2001, stipulated the following order of waste management strategies:

- national WMS is to be prepared by the Ministry of Environment by 31 October 2002;
- regional (*voivodship*) WMS is to be prepared by the Voivodship Board by 30 June 2003;
- district (*powiat*) WMS is to be prepared by the Powiat Board by 31 December 2003;
- municipal (*gmina*) WMS is to be prepared by the Gmina Board by 30 June 2004.

Example 1: Hierarchy of Waste Management Strategies in Poland

Preparation of a WMS is required by both the EU and national legislation in most of the Central and Eastern European countries. For instance, the Polish Waste Act stipulates that only waste-disposal-related projects that are included in waste management strategies will be eligible for financial support from the Environmental Fund.

Who should undertake the steps of the strategic planning cycle that lead to developing a waste management strategy? Chapter 3 will outline how best to assign the planning activities to various persons: technical experts (economists, engineers, environmentalists), stakeholders and staff of the City Council. If strategic planning is prepared for a multi-municipal level or regional level, for reasons of cost-effectiveness if large-scale infrastructure facilities are required, the process needs to be managed by a steering group that represents municipal authorities and stakeholders for all parties involved. Each step of the methodology presented in Figure 1 will be introduced in detail in Chapter 4. The description will emphasise those steps that can be addressed by the City Council staff and the group of stakeholders involved in the strategic planning process.

3 Before You Start

This section provides an overview of the input necessary to start and successfully complete the strategic planning process for waste management. It identifies the potential participants and outlines their assigned roles, and discusses the pros and cons of the stakeholder approach versus the technocratic expert approach. It concludes that an interaction between these two approaches is preferable. Finally, it discusses the importance of the EU accession process for the choices made in the strategy.

3.1 What is Needed to Proceed?

The key precondition for successfully developing a waste management strategy is the political interest and will of the city leaders, particularly if they have been democratically elected and are thus considered representative of the people served. The strategy process needs to be well managed, and it is usually appropriate for the City Council to run the process. Strategy development usually takes approximately one year. This allows adequate time for public involvement by the stakeholders. In brief, the following preconditions should be met to proceed successfully with the strategy:

Internal conditions:

- political commitment and support of the City Council developing and implementing the strategy;
- realistic target funding for the solid waste management strategy identified and agreed in principle;
- part-time involvement of one person (project co-ordinator) for the duration of the strategy drafting process;
- well-defined and agreed-upon methodology and output;
- sufficient coverage of a whole range of data;
- logistical support by the City Council, including rooms for stakeholder meetings, faxing and photocopying facilities;
- budget to fund external input, which is described below.

External conditions:

- Interest and active involvement of stakeholders;
- Professional facilitator;
- Involvement of technical experts throughout the process, and particularly for the appraisal of options, economic and technological assessment.

Recommendation: Do not start the stakeholder process before you are ready. Failure to meet the preconditions is likely to derail the process and frustrate the participants.



Before starting the process, these preconditions should be met. If some of these preconditions cannot be realistically met, the appropriateness of starting the process should be strongly reconsidered. It would be better to concentrate on finding ways to meet the preconditions than to start the planning. Otherwise, the planning process could derail, frustrating and disillusioning those involved in it. In particular, insufficient political support from the City Council, insufficient funding and insufficient interest from the stakeholders would make implementing the strategy very problematic. Consequently much effort would be wasted, and even a well-prepared strategy document could become just another report gathering dust in the office cabinet.



Activity 1

Are the minimum conditions met to proceed with developing a municipal waste management strategy?

I. Try to analyse whether the minimum conditions for successfully developing and implementing a waste management strategy in your city are met. Write comments in the “yes” or “no” column for each of the internal and external conditions.

Internal conditions:	Yes	No
1. political commitment and support of the City Council		
2. part-time involvement of one person (project co-ordinator) for the duration of the strategy drafting process		
3. well-defined and agreed-upon methodology and outputs		
4. sufficient coverage of a range of data		
5. logistical support from the City Council, including rooms for stakeholder meetings, faxing and photocopying facilities		
6. agreement on the potential funding sources, including loans and access to them, to finance the strategy		
7. political commitment to raising user fees if required		
External conditions:	Yes	No
8. interest and active involvement of stakeholders		
9. professional facilitator		
10. support of technical experts		

II. If you find that certain pre-conditions are not met, think what can be done to meet them. For instance, if a clear methodology is not available, and data coverage is poor, consider hiring consultants to prepare a methodology and collect data. Equally, the professional facilitator and technical experts can be hired for the project provided that sufficient resources are available within the City Council, or external assistance is offered. A more difficult issue is to raise interest and commitment among the local politicians and the stakeholders, and to obtain a political agreement on the target funding for the strategy.

Make a comprehensive list of possible actions that can be taken to meet those pre-conditions which you consider are not currently met:

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....

Planning probably should not proceed if there is a combination of weak political support, limited financing capacity and strong interest of stakeholders and local community. A strategy prepared in a participatory approach and not implemented because of a lack of political will or financial support could discourage any future community involvement in similar projects.

3.2 Participatory or Expert Approach?

The strategic planning process can be managed as a technocratic expert process, a stakeholder process or a combination of these two, referred to here as the ‘participatory stakeholder process’. The technocratic expert process is typically run by a group of experts who prepare specialised input and output of the strategic planning process based on their unique expertise and analysis but with limited involvement of stakeholders. They would largely be confined to consultation on the draft strategy document. While this approach can bring relatively quick and often reliable results, lack of active participation by stakeholders does not build ownership of the results and commitment to the plan.

The alternative is to manage strategic planning as a participatory stakeholder process, rather than a technocratic process run by experts in isolation from stakeholders. After all, participation in decision-making is the essence of the civic society to which all Central and Eastern European countries aspire. The participatory process is normally run by the technical experts, but involves a specially selected representative group of stakeholders from the onset to the end of the planning cycle. Technical and stakeholder workshops are convened a number of times to develop the strategy in a step-by-step approach following the methodological steps presented in Figure 1. The meetings normally are conducted by a facilitator who is accepted by all participants in the meeting as an honest broker.

The benefits of the participatory approach include:

- better identification of potential issues because the concerns of all interested and affected parties are considered;
- bringing local knowledge to the project—often stakeholders have much more knowledge about their environments than consultants;
- better identification of potential social impact;
- building ownership of the results;
- building commitment to implementing the plan;
- reducing opposition—often opposition comes from a lack of knowledge or understanding or even misinformation, but objective information often reduces this opposition.

However, public and stakeholder participation is not all rosy. The potential disadvantages include:

- increasing scope for disagreement;
- stakeholder participation takes time, and if not professionally managed may cause delays to the strategic planning process;
- additional costs.

Still, the advantages of the participatory approach greatly outnumber the potential disadvantages, particularly when we look at the implementation phase of the plan. The time invested into stakeholder participation during the preparatory phase pays off at the final negotiation and implementation phase.

Before deciding to apply the participatory process in developing a waste management strategy, it is useful to understand the present culture of public participation within your City Council. Arnstein's Ladder of Public Participation is one useful tool to identify current participation levels, as outlined in Figure 2. The Ladder shows eight different approaches to public participation.

participation	example	cluster
citizen control	self-government—the community makes the decision	degrees of citizen power
delegated power	government ultimately runs the decision-making process and funds it as well	
partnership	joint projects—community has considerable influence on the decision-making process, but the government still takes responsibility for the decision	
placation	community is asked for advice and token changes are made	degrees of tokenism
consultation	community is given information about the project or issues and asked to comment; their advice may or may not be sought through meetings or brochures	
informing	community is told about the project either through meetings or leaflets; community may be asked how to use the project site or adjacent areas	
therapy	Community is informed about the project and its benefits; there is no opportunity for stakeholders to express their concerns	non-participation
manipulation	community is selectively told about the project	

Figure 2. Different Rungs of Participation on Arnstein's Ladder

The least advanced rungs are 'manipulation' and 'therapy,' where the community is merely informed about the project (sometimes selectively, e.g., pointing out the benefits and hiding the disadvantages) and has no opportunities to express an opinion. The more advanced rungs of the ladder are informing and consultation, where the community is fully informed about the project and has the opportunity to express an opinion. The comments, however, may or may not be taken into account. Finally, the most advanced rungs are various degrees of citizen power, where the community can influence the decision-making process or even run the decision-making process (see Figure 2).

After deciding to undertake the stakeholder process, the next step is to decide who are the potential stakeholders for the strategy process in your city. The examples of waste management stakeholders include: City Council, local politicians, utility companies (e.g., water authorities or electricity generating companies), industrial and commercial producers of waste, representatives of regional authorities, environmental inspectorates, potential funders (e.g., environmental funds or development banks), representatives of neighbouring municipalities (particularly if a multi-municipality strategy is developed), representatives of community groups or residential communities, NGOs, research institutions, local media, local politi-

cians, farmers and other potential market consumers of waste treatment by-products, labour unions, waste pickers, and the women who typically carry the waste out for collection and conduct the in-home source segregation of recyclables.

Activity 2

Evaluation of public participation in your city

Critically analyse the various rungs of public participation presented in Figure 2, reflecting on the past three municipal projects in your city that caused some degree of public opposition. Which rung of the participation ladder best reflects the practice in your city?

To start the strategic planning process, your City Council and administration should be aiming to be at least within the rungs representing the *degrees of tokenism*. If you find that your city is in a *non-participation* rung or informing rung of the ladder, you should consider taking the following steps:

- decide realistically on the extent of participation that is feasible in your city;
- convince your decision-makers that the participatory approach is beneficial and/or;
- seek the advice of a public participation specialist who could design the participatory process for you, recommending various techniques that could be applied to raise the degree of participation in the process. These may include surveys, focus groups, dissemination of materials, displays, information days, public meetings and media relations.



Activity 3 will help you identify stakeholders for your municipal waste management strategy.

It should be made clear that a well-managed strategic planning process requires integrating the participatory and the expert processes. Close co-operation between the experts and the stakeholders is essential. The interplay between the experts and the stakeholders is one of the key challenges of the strategic planning process. Certain steps of the strategic planning process need to be undertaken by experts or specialists, including: technology assessment, economic and financial appraisal, and environmental impact assessment. This expert participation, whether available within the administration or only externally, should be integrated with the stakeholder process. Chapter 4, which discusses the steps of the strategic planning process, will describe which steps the experts should lead and which steps the stakeholders should lead, bearing in mind that interaction between them is always essential.



Activity 3

Identification of stakeholders for municipal waste management strategy

Step 1. Preparation of a long list of stakeholders

Using the list presented below for an idea of how to proceed, try to identify all potential stakeholders who could take part in developing the municipal waste management strategy:

1. institutions and companies with specific responsibilities for waste management in your city including City Council, waste operators and environmental inspectorate
2. organisations with economic interest in waste management in your city including waste producers, recycling companies, potential donors or funders, and waste pickers
3. organisations with other interest in waste management in your city including environmental NGOs or research institutes
4. organisations or individuals directly affected, positively or negatively, by the present waste management practices in your city, including housing co-operatives, groups of residents, etc.
5. organisations or individuals indirectly affected, positively or negatively, by the present waste management practice, such as villages affected by negative effects of the existing landfill site or residents affected by the transfer stations
6. organisations or individuals not affected by the present waste management practice in your city, which, however, think that they are affected including residents claiming unjustified deterioration of their living conditions due to operation of the waste disposal, treatment or transfer facilities
7. organisations or individuals who may be affected in the future by municipal waste management practices, including agriculture or horticulture producers who may use compost, residents located close to alternative sites for new landfills, etc.

Step 2. Preparation of a short list of stakeholders

Once you complete the long list of stakeholders, approach them with a project description (including work plan, concise methodology, expected output and necessary input), and solicit their views. This can be done, for instance, with a survey exploring the present level of satisfaction with the waste management in your city, asking whether they would be interested in taking part in the strategy development process. (A sample survey can be found in Appendix 2) Those who actively respond should be invited to the strategy making process.

Step 3. Invitation of stakeholders to the strategy preparation

It is a good practice that the mayor officially approves the list of invited stakeholders. The final step is to send official invitations for the first stakeholder meeting.

3.3 Centralised or Decentralised Approach?

An important dimension of strategic planning for waste management is deciding whether the process should be managed centrally by the City Council or whether it should be decentralised so that decisions are taken at the lowest possible level. The decentralised approach responds to the Subsidiarity Principle, which stipulates that decisions should be taken at the lowest possible level consistent with responsibilities and resources. In reality both approaches may be necessary, depending on problem area. Collection and sweeping systems have minimal economies of scale, and thus planning these systems could be conducted at a more decentralised level than, say, planning transfer systems or disposal facilities. Transfer systems require a citywide perspective for strategic siting based on optimum 'waste sheds' and highway networks. Disposal facilities require significant waste

quantities to enable economies of scale, such as full utilisation of heavy equipment during a daily work shift.

Households should have a say in what level of service they desire, what is affordable, how much effort they will undertake to support the system, and what they are willing to pay to participate in. For instance, in poorer neighbourhoods, households may be satisfied with communal bins even though it may require carrying waste some distance. In richer neighbourhoods, households may prefer and be willing to pay for kerbside pickup. It is particularly important to get household input on source separation schemes where their participation and co-operation would be essential.

Some components of the municipal WM system may be addressed only by stakeholders at a level of decision-making higher than the household or neighbourhood. For instance, large infrastructure facilities such as incinerators or sanitary landfills typically need to be designed and managed on a citywide or even regional scale. Responsibilities for their operation usually lie with municipal, metropolitan, or even provincial authorities or their designated private sector operators. Regional or multi-municipal solutions are recommended for certain types of infrastructure facilities, to achieve economies of scale and ensure adequate environmental protection and control. This is particularly true for sanitary landfills or waste-to-energy facilities. To achieve adequate economies of scale for landfills and waste-to-energy facilities, inter-municipal agreements or regional co-operation may be necessary.

3.4 EU Waste Legislation

The countries of Central and Eastern Europe are facing radical changes in waste management related to their forthcoming accession to the EU. The EU environmental legislation must be adopted at the national level and implemented at the local level.

Waste management planning tends to be a long-term process; hence, it is prudent to follow the key requirements of the EU waste management legislation in developing the city waste management strategy, especially because these requirements are being adopted into national legislation as part of EU accession. The process of incorporating EU legislation is one of the key external factors influencing the development of municipal waste management strategies.

The key requirements of EU waste legislation are presented below, with emphasis on two key directives:

- the Framework Directive on Waste 75/442/EEC;
- the Directive on the Landfill of Waste 99/31/EC.

A more detailed description of the EU waste legislation is provided in Appendix 3.

The Framework Directive on Waste (FDW) plays the role of the umbrella directive setting definitions, principles, procedures, institutional setting for all waste

management. The FDW is supplemented by specific ‘daughter’ directives⁴ that set requirements and guidelines for dealing with specific types of waste such as packaging waste, sewage sludge, hazardous waste, batteries, PCB, tyres and waste oils. The daughter directives specify also methods for waste treatment and disposal, including landfilling and incineration. The FDW provides a common definition of waste across member states:

Waste is any substance or object in the categories set out in annex 1 of the Waste Framework Directive which the holder discards or intends or is required to discard.



The FDW outlines a hierarchy of waste management listed from the most desirable to the least desirable technical actions. While landfilling is listed below as the least desirable action, it is actually an essential component of every waste management system because there are residuals from each of the other actions such as ashes from incineration or noncompostables from composting. The Framework Directive outlined below simply suggests that landfilling needs to be minimised, that all wastes need to be recycled, recovered, reused, or treated to the extent practicable to reduce the demand for landfill capacity and the potential environmental risk of landfilling.

- Prevention and minimisation of waste generation
- Re-use of waste
- Recycling of waste
- Recovery of waste
- Use of waste as source of energy
- Incineration
- Landfilling



The FDW puts emphasis on prevention and minimisation of waste followed by utilisation of waste. Landfilling, as noted above, is to be minimised. Although useful as a set of default guidelines, using this hierarchy to determine municipal waste management options does not necessarily result in the lowest environmental burdens, nor an economically sustainable system. Different materials in the waste stream are best dealt with by different processes.

One of the key requirements of the FDW is to draw national waste management plans following strategic planning methodology. It also establishes institutional, enforcement and monitoring system for waste management.

⁴ The daughter directives include: Directive on the Landfill of Waste 99/31/EC; the Directive on the Incineration of Waste 2000/76/EC; the Packaging Waste Directive 94/62/EC; the Sewage Sludge Directive 86/278/EEC; the Hazardous Waste Directive 91/689/EEC; the Batteries Directive 91/157/EEC; the Directive on the Disposal of PCBs and PCTs 96/59/EEC; the Waste Oil Directive 75/439/EEC.

Activity 4

Application of the waste management hierarchy

Review the waste treatment and disposal facilities available in your city, and the current municipal waste management practices. Where is your city in relation to the hierarchy presented below? What can be done to shift the emphasis from disposal to treatment and recovery of waste, and move up the hierarchy? What can be done to minimise generation of waste? List the following:

- infrastructure facilities that would have to be built to move up the hierarchy;
- organisational changes that would have to support the expanded infrastructure base;
- the level of institutional capacity and public awareness needed to move up the hierarchy.

How do you estimate the cost implications of moving up the hierarchy? How and in what order, in your view, should the facilities required by the waste management hierarchy be gradually phased in?



The Landfill Directive outlines technological and management requirements for landfill operations. For example, all landfills should be equipped with leachate collection and treatment systems, as well as landfill gas collection and utilisation systems. No liquid waste should be allowed in landfills. Co-disposal with hazardous waste is prohibited.

The Landfill Directive requires that landfill tariffs incorporate full cost including closure and aftercare for 30 years. It also sets targets for reduction of 1995 levels of biodegradable municipal waste sent to landfills to 75 per cent in 2006, 50 per cent in 2009 and 35 per cent in 2016.⁵



Implementing the EU waste legislation in the CEE countries will require significant financial investment. For instance, it is estimated that the total investment needed in Poland to meet the infrastructure requirements of the EU directives is 3.3 billion. The same figure for Bulgaria is 2.45 billion⁶. Up to 75 per cent of these costs can be covered by EU pre-accession and accession funding (ISPA, Phare, Structural and Cohesion Funds).

However, phasing in the infrastructure required by the EU waste legislation will increase operational costs, and these will have to be borne by the population. While the near-term financial burden may be significant, it is essential to recognise the savings in 'remediation avoidance costs' that could be required to mitigate pollution from improper disposal, which could easily be as great or even greater a burden.

⁵ The targets are binding for the present member states. It is likely that the candidate countries will be granted extensions on these targets

⁶ EDC Ltd and EPE (1997). Compliance costing for approximation of EU environmental legislation in the CEE.

4 How to Make it Happen? Preparatory Phase

This chapter will lead you step by step through the preparatory phase of the strategic planning process for municipal solid waste management. It follows the methodological steps presented in Figure 1. The preparatory phase of strategic planning and strategy development is very important. Successful waste management strategy depends on a well-established strategic planning process. The responsibility for the preparatory phase lies with the co-ordinator, who usually represents the city administration.

4.1 Setting the Project and the Stakeholder Process

Before the strategic planning process for a waste management strategy can begin, the project needs to be officially established. Usually, the City Council nominates a project co-ordinator charged with the overall responsibility for managing the project and process. The co-ordinator is then assigned a number of important organisational actions to establish the project, namely:

- establishing a co-ordination office, ideally located within the City Council, with sufficient access to computers, printers, photocopiers and stationery;
- securing support from facilitators and technical experts such as economists, waste technologists and environmentalists;
- setting up the methodology for preparing the strategy and realistic output from the process;
- identifying stakeholders (see previous chapter for potential groups of stakeholders) to be invited to the process. One facilitator can generally manage a group of stakeholders of up to 25 to 30 people;
- arranging official approval of the stakeholder group and project methodology by the mayor;
- inviting the stakeholders to the strategic planning process, including meetings and document reviews.

The methodology should also be provided and explained to the stakeholders at the first stakeholder meeting. Useful comments and suggestions should be incorporated into the methodological framework.

Activity 5

Setting up the strategy process

Analyse the six organisational needs presented in this section:

- co-ordination office;
- technical experts and facilitator;
- methodology;
- identification of stakeholders;
- mayor's approval of stakeholder group and methodology;
- invitation of stakeholders.

Which of these needs can be addressed by the internal City Council expertise and resources?

Is political support of the Mayor secured?

What external assistance such as experts, facilitators or methodological advice has to be sought?



4.2 Gathering Information

Waste management companies, the city administration staff, external experts or qualified stakeholders can collect data



In parallel with the organisational arrangements, data collection should start using the existing sources of information available at the city level. These may include results of monitoring, data collected by statistical offices, questionnaire surveys, assessments of existing infrastructure and monitoring systems, identification of infrastructure gaps or technology assessments. Such data are necessary to prepare status reports for presentation to stakeholders, and to proceed with developing the strategy, particularly the stages of scenario development and appraisal, and action drafting.

Without adequate, reliable data strategic choices cannot be made, and the waste management strategy cannot be developed.



A significant volume of data needs to be collected and processed to prepare the strategy. The data are likely to include:

- data on total solid waste types and quantities generated in the city (municipal, commercial, industrial, hazardous and other);
- composition of waste-organic matter, glass, plastic, paper, ashes, metal, wood, textiles, hazardous waste, etc.;
- average calorific value of waste, humidity, waste density and waste fractions;
- prediction of future waste stream and composition, which can generally be linked to changes in per capita gross domestic product (GDP);
- appraisal of the condition of infrastructure (waste treatment, transfer and disposal facilities) and equipment (trucks, containers), as well as estimated fleet availability and operability;
- remaining waste capacity and estimated life span of the existing waste management facilities;

- list of entities that carry out waste management operations;
- data on waste collection systems, including time and motion data as well as productivity data;
- coverage of the collection service among households;
- current practices for disposal and treatment of waste: landfilling, incineration, composting, recycling, etc.;
- analysis of unit costs (costs/tonne) of solid waste collection, street sweeping, transfer, open dumping and sanitary landfilling, incineration, physical and chemical treatment, composting, recycling, etc.;
- financial standing of the waste company and the city, including their capacity to take out loans;
- capacity of the local market for recycled materials and compost, demand pricing sensitivity, and estimated supply versus demand of competitive products;
- assessment of how present waste management practices in the city comply with legal requirements.

In many municipalities, the data listed above will not be adequately available and reliable for planning purposes. The data that do exist must be checked and calibrated prior to its use for planning. For instance, waste composition data is commonly out-dated, fragmentary or incorrect. Also, budgets are commonly known, but seldom are all of the costs known or clearly shown in one waste management department of the budget. Research or monitoring will be necessary to collect the missing data. The first step is to identify the missing data and prepare a data collection plan. Some data collection is very time consuming, and some data collection requires repetition throughout the year. For example, data on waste composition and physical properties of waste normally take one year to collect. This is because of significant seasonal variations in waste composition and properties, as well as peak generation periods.

Activity 6

Availability and collection of data necessary to develop a waste management strategy

Review the list of data requirements presented in this section. Are all data listed available? How old are the data available? Do they require an update?

Identify data gaps and list the approximate time frame necessary to collect the data. How much time do you estimate is needed to collect the missing data? Is the City Council able to collect all missing data? If not, what kind of external assistance will you need to collect the missing data?

Prepare a data collection plan in the format presented below.

data gap	Who will collect?	estimated collection and processing time	quality reviewer
e.g., waste composition			



4.3 Preparing Status Quo Report

The status report should be drafted by the project co-ordinator, the City Council or by external consultants. It should be presented to the stakeholder group for their comments. It is recommended to organise a first stakeholder meeting to discuss the status report and present the methodology for strategy development.



Based on the data collected, a report describing the present conditions and problems of the city waste management infrastructure and services should be written by the city administration or by experts. The report should outline the following areas:

- types and quantities of data generated in the city;
- composition and properties of waste;
- predicted changes in waste management;
- present waste management arrangements in the city;
- waste disposal and treatment facilities, including their remaining life span and compliance with national and EU environmental requirements;
- coverage of collection services;
- costs of waste collection, treatment and disposal;
- level of satisfaction with the present waste management practice in the city (based, for instance, on the results of a survey) if available;
- financial management (current level of cost recovery and cost accounting system);
- affordability analysis for future cost increases of waste collection and disposal services, if available.

Once completed, the report should be sent to the group of stakeholders for comments. Discussion on the status report could initiate the series of stakeholder meetings. The report should incorporate comments and amendments from stakeholders. In addition to discussing the status report, the first stakeholder meeting should also include a presentation and discussion on the objectives and methodology of the project. The stakeholders should comment in particular on:

- the scope of work;
- time horizons of the strategy;
- extent of the strategy - single or multi-municipality. The larger the geographical area and population served, the lower the unit costs.

5 How to Make it Happen? Strategic Phase

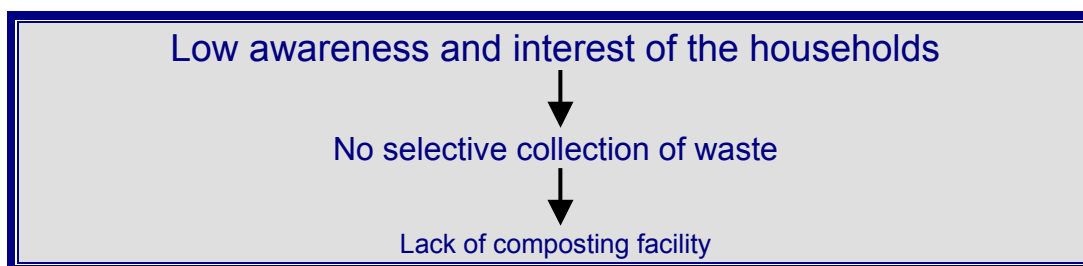
This chapter will guide you step by step through the main phase of the strategic planning process for municipal solid waste management (see the methodological steps presented in Figure 1) Responsibility for the strategic phase lies with the project co-ordinator, external experts and the stakeholders. The best practice for distributing responsibilities among the key players will be indicated in each section. This chapter provides quite detailed guidance for the City Council and project co-ordinator on how to proceed with the methodological steps.

5.1 Identifying Problems

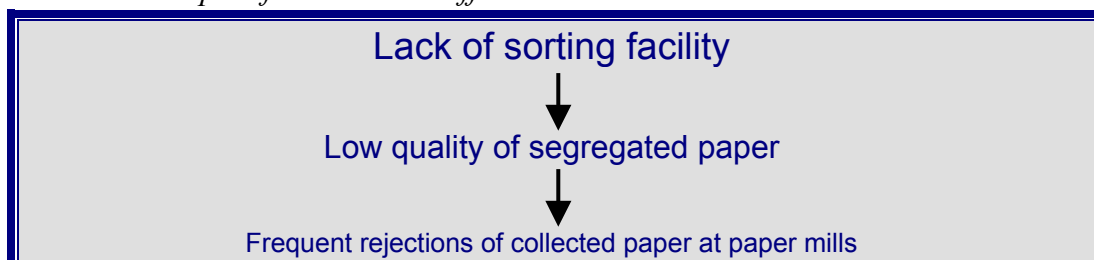
This step can be led by a group of stakeholders with assistance provided by facilitator, and in co-operation with experts who may offer their expert opinion and comment on the results. It should be undertaken at the second stakeholder meeting.



Stakeholder meetings should be organised to identify the main problems related to waste management in the city. A number of these problems will have been presented in the status report. A useful way of having stakeholders define problems is to initiate a brainstorming session, to write each problem on a separate sheet of paper and place it on the wall. The problems should be grouped and scrutinised. Some of them may overlap, some may be put together, and some may be in conflict with each other. Subsequently, the causal relationships should be analysed, identifying those problems that can be considered causes of other problems. One example of a cause-and-effect-chain would be:



Another example of a cause-and-effect-chain:



Most likely, the 'cause' problems will have a number of 'effect' problems. The problems should be placed on the wall vertically with the 'cause' problems at the top, and the 'effect' problems at the bottom. Make an inventory of the meeting results and send it to each participant.

5.2 Generating Objectives to Address Problems

This step can be led by the stakeholders in a facilitated discussion and in co-operation with experts who give their opinions and methodological advice and comment on the results. This step can be completed at the second stakeholders' group meeting.



Continuing the stakeholder meetings, redirect the participants' thinking from problems to goals, that is, from negative to positive thinking. If the problem is, for instance, "air emissions from the incinerator do not meet emissions standards", the goal would be "upgrading the technology of the incinerator to meet the emissions standards."

The objectives should be re-grouped and scrutinised to avoid overlapping or conflicting goals. Expert involvement is very useful at this point.

Make an inventory of the meeting results and send it to each participant.

5.3 Prioritising Objectives

This step can be undertaken at the third stakeholder meeting. If the stakeholder prioritisation method is applied, this is undertaken by the group of stakeholders in co-operation with experts. Allow at least six hours for this exercise with an experienced facilitator. If expert prioritisation is applied, it is undertaken by experts and reviewed by the stakeholders.



The essence of developing a waste management strategy is setting priorities. It is both one of the most difficult and most important steps of the strategic planning process. The list of objectives is likely to be long and very demanding in both costs and human resources. Some objectives may conflict with others. Hence, an impartial prioritisation technique should be applied to select which objectives will be given preference. Methodological consistency is vital to arrive at reliable results.

Setting priorities is a complex and controversial process. People tend to see different priorities, depending on their professional history and experience. For instance, water specialists tend to favour water projects, nature conservationists favour nature conservation projects, local economists favour projects offering the best value for money, and the community prefer projects that do not place additional financial burdens on households. Hence there is a need to set up a multidisciplinary group to compensate for individual biases. Political lobbying often finds its way to influence the selection of priorities. Also, hidden personal agendas for economic gain may influence the selection of priorities. The more diverse the group of stakeholders, the more likely these biases and agendas will be minimised. Participation by technical experts is essential in this process to limit the influence of individual biases through articulate technical and concrete analysis.

There are many methods of setting priorities. Priorities can be set at various stages of strategic planning:

- setting priority problems;
- setting priority objectives;
- setting priority actions

The prioritisation methodology depends on what is being prioritised, the availability of data, the degree of participation in the strategy development, and the time and resources available.

A good practice in setting priorities is to ensure maximum objectivity and transparency in the process.



The least desirable method is setting priorities by an *ad hoc* political or administrative decision, without consultation with the stakeholders or the experts. Even if the priorities are well justified, they are likely to create opposition simply because the stakeholders were ignored and feel their specific interests are not adequately reflected in the strategy.

Priorities can be set by experts, based on effectiveness analysis, cost-benefit analysis, feasibility studies or economic and environmental appraisals. Expert prioritisation is particularly useful for setting priorities among projects and actions that can be monetised. It is less recommended for setting priority problems and objectives where value judgements play an important role. Professionally handled appraisals of actions or options create a solid basis for well-justified priority setting. It is difficult to argue with the priorities set in such a process. However, this approach also loses the element of ownership. This is likely to lead to some opposition undermining the results of the expert analysis or referring to alternative studies that have conflicting results. There is also an analytical problem with the expert approach. To select priorities, the effectiveness of options and actions must be compared. The most reliable way of making the comparison is to express the costs and benefits of each action in one unit, e.g. in monetary terms or in physical units. This leads to controversial results, such as monetisation of environmental benefits or skills gained in educational project, putting a money value on natural objects, etc. For instance, choosing among an engineering infrastructure project, nature conservation project and awareness-raising campaign is likely to be controversial.

A stakeholder Delphi approach offers an interesting alternative to experts setting priorities, and it will be discussed in greater detail. It is particularly useful for choosing among problems and objectives. It is usually based on a system of prioritisation criteria, scoring and weighting. The advantage of this approach is that it builds ownership of results through participation, transparency and objectivity, and it allows setting priorities among various types of actions, such as infrastructure, nature conservation, planning, monitoring and awareness raising.

The process consists of the following stages:

- A selecting prioritisation criteria;
- B setting weighting system;
- C setting scoring system;
- D doing the prioritisation exercise with a group of stakeholders.

Expert involvement in the stakeholder prioritisation process is particularly important at the stage of selecting the prioritisation criteria and scoring system. These methodological stages are relatively complex, and expert advice is particularly useful. Each of the four stages is described below. The aim is to provide guidance for the project co-ordinator and/or facilitator.

If the co-ordinator or facilitator is not familiar with the method, it is recommended to practice the method several times to gain sufficient familiarity.



A. Selection of prioritisation criteria

The credibility of the stakeholder process for setting priorities depends largely on the proper selection of prioritisation criteria. A criterion is useful when it can allow the evaluation of an objective. It is not an objective itself, but has to be measurable by indicators. A range of prioritisation criteria might include:

- total or annual costs, and related user fees or taxes;
- environmental benefits;
- health benefits;
- jobs creation for new facilities and potential job losses due to reduction of redundancy in the system;
- institutional capacity improvements;
- cost effectiveness and financial sustainability;
- size of beneficiary population, and impact on those living in poverty;
- creating a basis for implementing other goals or actions;
- social acceptability, and affect on the social condition of waste recyclers

B. Setting the weighting system

The criteria are not of equal weight. Some are more important than others, depending on the public values of the local stakeholders and the larger national or regional values. Thus, a weight needs to be attached to each criterion to acknowledge the differences in their importance. For instance, health benefits may be most important for communities affected by groundwater contamination, dust, noise, vermin, and odour from an adjacent landfill, whereas costs may be most important for more remote communities that are not directly affected by adverse health and environmental conditions.

A useful way of determining the importance of evaluation criteria is to ask the stakeholders to decide. A simple technique is to ask the stakeholders to place a dot on those criteria they find most useful. A good practice is to provide dots for about 60 per cent of the criteria. For example, if you have a list of 15 criteria, provide nine dots to each participant. One person can put only one dot per criterion. Count the number of dots allocated to each criterion. This gives each criterion a

weight. Those criteria that were given no dots are excluded from the list. For the ease of further calculation it is useful to divide each criterion by the criterion with the lowest score, so that this one receives a weight of '1'. For instance, if the lowest criterion scored five dots and the highest criterion scored 20 dots, following the calculation the lowest criterion receives weight $5/5=1$, and the highest criterion receives weight $20/5=4$.

C. Setting the scoring system

Apart from having a specific weight that reflects its importance, each criterion requires a scoring system to allow quantifiable evaluation. The general guidelines for preparing a scoring system are:

Wherever possible quantitative values should be applied. These include financial units, physical units such as pollution reduction, number of species protected, etc. If that is not possible, and in many cases it will not be, put qualitative values in a well-defined hierarchy (for instance: none – low – medium – high).

Illustration of a scoring system:

Criterion: Estimated total cost in Euros:	
> 1 million	score 1
0.5 million - 1 million	score 2
0.2 million - 0.5 million	score 3
< 0.2 million	score 4
Criterion: Environmental benefits⁷:	
None	score 1
Low or indirect	score 2
Medium	score 3
High	score 4
Criterion: Size of beneficiary or affected population:	
0 – 25%	score 1
25 – 50%	score 2
50 – 75%	score 3
75 – 100%	score 4
Criterion: Leads to waste stream reduction	
No waste stream reduction	score 1
Up to 3% waste stream reduction	score 2
Up to 10% waste stream reduction	score 3
More than 10% waste stream reduction	score 4
Criterion: Social acceptability	
None	score 1
Low	score 2
Medium	score 3
High	score 4

⁷ Specific quantitative values can be put on the scores. For instance, the pollution reduction potential can be applied to differentiate among the scores. In this case, 'none' relates to '0%' pollution reduction, 'low or indirect' relates to '0-10%' pollution reduction, 'medium' relates to '10-25%' pollution reduction, and 'high' relates to 'more than 25%' pollution reduction).

D. Doing the prioritisation exercise with a group of stakeholders

When the evaluation criteria are selected, the weights are attached to each criterion, and the scoring system is set, stakeholders can set the priorities. Each objective, or action if actions are prioritised, is analysed using the prioritisation criteria. Each objective or action evaluated receives certain results from each criterion. For example, it has scores on total costs, health benefits and environmental benefits. The individual result per criterion (e.g. health benefits) is obtained by multiplying the score (e.g. score 3 for total cost of 250,000) by the weight attached to the criterion (which reflects its importance). The results from each criterion are then added up to obtain a specific number for each objective. Activity 7 will guide you through an exercise illustrating the prioritisation methodology.

When this task is complete, each objective or action evaluated is given a specific priority result. The final step is to list all objectives or actions in the order of priority from top to bottom.



Activity 7

The stakeholder prioritisation exercise

The purpose of this exercise is to demonstrate how to set priorities. The project co-ordinator or the group facilitator should do the exercise prior to the third stakeholder meeting, which is on setting priorities. Two objectives were selected for prioritisation:

Objective 1: To extend the waste collection services to all villages in the municipality

Estimated capital cost: 100,000 Euros. High operational costs

Objective 2: To clean up all small illegal dumpsites.

Estimated cost: 350,000 Euros. Very low operational costs

Four prioritisation criteria are pre-selected for the exercise. (Normally the stakeholder group should select criteria.)

estimated total costs	received weight	4.8
social acceptability	received weight:	3.5
environmental benefits	received weight:	3.0
size of beneficiary population	received weight:	2.0

The scoring system for each criterion was illustrated in section C. We assume that during the course of the prioritisation exercise the scores below were allocated to the prioritised objectives. (Normally the stakeholder group would set the scores.)

- the total cost of objective 1 (100,000 Euros) gives the objective a score of 4; objective 2 (total cost 350,000 Euros) receives a score of 3;
- it is assumed that the environmental benefits, including the pollution reduction potential, of objective 1 (extending collection services) are lower for the city than the environmental benefits of objective 2 (clean up of illegal dumpsites). Hence, objective 1 received a score of 3, and objective 2 received a score of 4;
- it is assumed that objective 1 would serve less than 25 per cent of the municipality's population (score 1), whereas objective 2 would serve 25 per cent to 50 per cent of the population (score 2);
- it was found that the extension of waste collection services is highly desirable socially (score 4), whereas cleaning up illegal dumpsites has medium social acceptability (score 3).

Results of the prioritisation exercise are shown in the table below. It demonstrates that objective 1 'extending the waste collection services to all villages in the municipality' receives higher priority (see the table below).

Criteria \ Objectives	total cost (weight 4.8)	environmental benefits (weight 3.0)	size of population (weight 2.0)	social acceptability (weight 3.5)	Result
extend waste collection	(4x4.8) 19.2	(3x3.0) 9.0	(1x2.0) 2.0	(4x3.5) 14.0	44.2
clean up all illegal dumpsites	(3x4.8) 14.4	(4x3.0) 12.0	(2x2.0) 4.0	(3x3.5) 10.5	40.9

Select three objectives and apply the methodology presented above to select priorities among them.

Figure 3 presents a real-life example of setting priorities for WM strategy in a participatory approach. Six prioritisation criteria were applied to set priorities among eight objectives.

Criteria Objectives	Environmental and health benefits (weight 2.2)	ness (ratio of benefits to costs) (weight 2.0)	Estimated total cost (weight 1.6)	Social/ economic effect (weight 1.6)	Social acceptability (weight 1.6)	Size of population benefiting (weight 1.6)	Results
1. building a facility for neutralisation of hazardous hospital wastes	3 x 2.2 6.6	3 x 2.0 6.0	3 x 1.6 4.8	1 x 1.6 1.6	3 x 1.6 4.8	3 x 1.0 3.0	26.8
step by step the solid waste collec- tion in villages	3 x 2.2 6.6	3 x 2.0 6.0	3 x 1.6 4.8	2 x 1.6 3.2	3 x 1.6 4.8	1 x 1.0 1.0	26.4
3. review and recultivate the old illegal dump sites	3 x 2.2 6.6	3 x 2.0 6.0	3 x 1.6 4.8	1 x 1.6 1.6	3 x 1.6 4.8	2 x 1.0 2.0	25.8
4. set up collection of hazardous wastes from households	3 x 2.2 6.6	2 x 2.0 4.0	2 x 1.6 3.2	1 x 1.6 1.6	2 x 1.6 3.2	3 x 1.0 3.0	21.6
5. design and build a new sanitary land- fill	3 x 2.2 6.6	2 x 2.0 4.0	1 x 1.6 1.6	2 x 1.6 3.2	2 x 1.6 3.2	3 x 1.0 3.0	21.6
6. recultivate and recon- struct the existing dumpsite	3 x 2.2 6.6	2 x 2.0 4.0	2 x 1.6 3.2	1 x 1.6 1.6	3 x 1.6 4.8	1 x 1.0 1.0	21.2
7. organise composting	3 x 2.2 6.6	2 x 2.0 4.0	1 x 1.6 1.6	2 x 1.6 3.2	2 x 1.6 3.2	2 x 1.0 2.0	20.6
8. set up a separate collection of recycling wastes	2 x 2.2 4.4	2 x 2.0 4.0	2 x 1.6 3.2	2 x 1.6 3.2	1 x 1.6 1.6	3 x 1.0 3.0	19.4

Figure 3. Setting priority objectives for the Pazardjik Solid Waste Management Strategy

The results show that the low cost objectives of high health and environmental effectiveness were given the highest priority, which is a common sense solution. The top priorities include setting up a new landfill site, recultivation of the existing dumpsite and collection system of hazardous waste. The lowest priorities were attached to the system of separate collection and composting. These can be phased in when the key facilities and services are in place.

5.4 Generating Alternative Scenarios to Achieve Strategic Objectives

This step can be undertaken at the fourth stakeholder meeting as a combination of expert and stakeholder approaches. The group of stakeholders provides a set of guidelines for developing alternative scenarios, and makes sure that the scenarios adequately reflect the priority objectives. The experts provide alternative options or propose alternative scenarios.



Potentially, there are many ways to achieve the objectives selected for the strategy. The key challenge in making the strategy is to select the most cost-effective approach. The priority objectives set for the strategy guide the development of alternative scenarios. Several alternative scenarios should be developed, appraised and compared to choose the most cost-effective and affordable scenario. If waste management in your city is reasonably advanced and you have a long-term waste disposal facility (e.g., a sanitary landfill site that complies with technical standards), the strategy will focus on moving up the waste management hierarchy. That is, it will emphasise moving away from waste landfilling to waste prevention, reuse and recycling. In such a strategy, no major capital investment is necessary, and the strategy can be built around increasing waste recycling and processing capacity and awareness.

However, if the city is facing a waste disposal crisis (e.g., the present disposal facilities are filling up and a major capital investment is needed), many possible scenarios are possible to tackle the problem. In principle, capital investment would concentrate on building a new landfill site or building an incinerator. Each of these two scenarios provides many opportunities for ancillary facilities such as transfer stations, sorting facilities, composting plants, bulky waste disassembly and recycling facilities. The scale and timing of how steps toward recycling and waste reuse are phased in depend on the resources available and the population's ability to pay increased fees.

The Spanish city of Pamplona (population 282,000) developed and analysed five different scenarios when preparing an integrated solid waste management strategy (see Appendix 6).

- The baseline scenario reflected the existing waste management situation in Pamplona, which is based on source separation, bring sites, a material recovery facility (manual sorting of co-mingled recyclable waste) and a landfill site. Ten per cent of the waste collected is recycled and 90 per cent is land-filled.
- The second scenario assumed the addition of a composting facility. It was calculated that this would divert 23 per cent of waste away from the landfill site, bringing the landfilling rate down to 67 per cent.
- The third scenario assumed an extra round of kerbside collection. This would have no effect on the share of various waste treatment disposal methods, keeping it at the same level as in scenario 2: 10 per cent recycling, 23 per cent composting and 67 per cent landfilling).
- The fourth scenario assumed the addition of paper to composting but without the extra round of kerbside collection in scenario 3. It was calculated that this would increase the composting rate to 34 per cent, reduce the recycling rate to 4 per cent, and consequently reduce the landfilling rate to 62 per cent.
- Finally, the fifth scenario assumed the addition of both an extra round of kerbside collection and the addition of paper to composting. It was calculated that this scenario would bring the same composting, recycling and landfilling rates as scenario 4.

Example 2: The process of developing scenarios.

An example of two alternative scenarios that are not based on quantitative targets is presented below (see also Appendix 7 for alternative scenarios developed in the city of Pazardjik, Bulgaria).

SCENARIO 1

The focal point of this scenario is a modern sanitary landfill with leachate collection and treatment systems, landfill gas collection and a utilisation system. The sanitary landfill site is to be integrated with a waste recycling and treatment system including:

- primary segregation at the source (dual containers for wet and dry fractions);
- collection sites for recycling paper, glass, plastic and metal;
- central composting facility, located in the vicinity of the landfill site area, for green and wet waste.

SCENARIO 2

The focal point of this scenario is a modern incinerator with energy recovery, and with a flue gas cleaning facility that meets EU emission standards. In addition, a new cell within the existing landfill site needs to be constructed to dispose cinder and ashes. The incinerator is to be integrated with waste recycling and the treatment system. This system will differ from scenario 1 to ensure a high calorific value for waste that is sent to the incinerator. The system will include:

- collection sites for recycling glass, metal and bulky waste;
- composting facility for green waste;
- bulky waste disassembly and recycling centre.

In addition to infrastructure improvements, each scenario should also include the planning, institutional, organisational and educational actions necessary to implement the proposed waste recycling and treatment systems.

Activity 8

Generating actions and setting up waste management scenarios

Imagine a situation where the core of a municipal waste management strategy is to increase recycling rates (currently at 5 per cent) to save landfill space and to comply with new requirements of national legislation.

There are two proposed options:

1. to achieve 20 per cent recycling rates (for all recyclable materials and compostable waste) in four years
2. to achieve 40 per cent recycling rates (for all recyclable materials and compostable waste) in four years

Try to make a long list of actions necessary to achieve each option. What differences do you see in:

infrastructure needs?
types and number of containers?
number and types of vehicles?
market for compost?
education and awareness-raising needs?

What are the cost implications, both capital and operational, for each option?



5.5 Appraisal of Alternative Scenarios

This step should be undertaken by experts from within the city administration if such expertise is available internally or, usually, by external experts.



The next step is appraising pre-selected scenarios. This section outlines a number of appraisal methods. Because experts usually undertake the appraisal, this section is not intended to provide in-depth guidance and exercises on the appraisal techniques. (These can be found in specialist literature.) The section's purpose is rather to point out the requirements and limitations of various appraisal techniques so that the reader can make an educated choice in sub-contracting specialist studies. The selection of methods includes:

Compliance with national legislation

Review of the proposed scenarios to check whether they comply with legal requirements such as engineering requirements for landfill site, water quality standards for discharges from the leachate treatment plant, product standards for composting, occupational health standards for sorting, particulate and bioaerosol standards for worker respiratory protection, and national targets for waste recycling. It would also be prudent to check the requirements of EU waste legislation if they are not yet fully reflected in your national legislation.

Suitability of technology

There appear to be many technologies that could be applied in your waste management system. However, rigorous scientific examination shows that there are actually few. Collection technology choices typically involve choosing between compaction and non-compaction vehicles, fast versus slow vehicles, large versus small vehicles, and door-to-door systems versus communal bin systems. Transfer technology choices typically involve open facilities versus enclosed facilities, and compaction versus non-compaction loading systems. Sanitary landfill choices typically involve gas ventilation versus gas recovery, leachate attenuation versus leachate collection and treatment. Treatment choices focus on composting, combustion, materials recovery, and methanisation. It is important not to be carried away by magic technological solutions that purport to ‘turn garbage into gold’.

Always check whether a technology has been tested and successfully applied in other countries. Check its average unit cost per tonne.



Activity 9

Checking the suitability of proposed waste treatment technology

Before you analyse any options in your strategy economically, it is important to check whether the specific conditions of your city are suitable for the technologies in question. Check in particular:

- Is your waste stream sufficient for the technological process at present or in future?
- Are the physical and chemical parameters of your waste suitable for the technology?
- Does the technology meet environmental standards required by legislation?
- Is the unit cost affordable to achieve full cost recovery?
- Is this solution cost effective and affordable?

If any of the above conditions are not met, the technology in question should not be adopted. If possible, it could be adjusted to your specific conditions.



Appraisal by unit cost

This is a very useful and common method for appraising waste management options. It is used to compare technologies and identify the least costly options by describing them in common terms, cost per tonne. The method is not applicable to comparing investments and technologies with soft actions such as education programmes or institutional and operational changes. Unit cost appraisal takes into account estimated life, capital costs, operational costs, labour costs, depreciation and amortisation costs, etc. For facilities that have a long life, it may apply discounted cash flow (putting future profits and costs in today's prices) and be ex-

pressed in present value. A cost-benefit analysis or a feasibility study may be needed to calculate the costs of the proposed actions.

$$\text{Unit cost} = \frac{\text{Present value of project's cashflow}}{\text{Present value of project's waste throughput stream}}$$

This figure is then used to calculate the average tariff needed to achieve full cost recovery. Unit costs for some middle-income countries in the late-1990s were

- open dumping: \$2-5/t;
- sanitary landfill: \$10-30/t;
- composting: \$10-40/t;
- incineration: \$50-100/t.

Appraisal by Cost-Benefit Analysis

This method requires that all costs and benefits associated with the proposed scenarios are calculated and discounted. It is particularly important to analyse all potential benefits, which include saving space in the landfill site (and consequently postponing the high capital investment required to build a new landfill site) due to separate collection, recycling and composting. Often the scenarios analysed are compared with a 'do nothing' option so that benefits can be adequately quantified. Subsequently, the Net Present Value (NPV) and Internal Rate of Return (IRR) indicators are calculated. The NPV represents the discounted value of the difference between revenues and costs throughout the period analysed. The IRR indicator is the real revenue rate that the scenario generates. It is also interpreted as the discount rate at which the NPV value equals zero. Financially viable projects or scenarios require that both the NPV and the IRR values are positive. However, in the municipal waste management sector, these values are sometimes negative or close to zero. This indicates that either external (e.g., assistance) funding is required to finance the project or scenario, the revenues should be increased (for instance a tariff increase) or the quantitative targets should be made less ambitious.

Environmental and social impacts assessment

It is possible that legal, technological and unit cost appraisals would bring positive results, but the proposed options would have negative environmental and social impacts. It is, therefore, important to evaluate these impacts. Such an evaluation will be required anyway at the project preparation phase. Environmental and social impact assessment looks at all possible (positive, negative and cumulative) impacts associated with the proposed project. The assessment predicts impact magnitude and significance, analyses alternatives and proposes mitigation measures. It is useful to link the predictions to a 'do nothing' option, representing the environmental impact of the present waste management system.

Public support/opposition

Public opposition may stop or delay the project with protests against site location, choice of technology or increasing tariffs. It is important to check public preferences and undertake an affordability study. If a stakeholder process is applied properly, this method of appraisal is normally not needed.

5.6 Selection of Scenario and Drafting of Strategy

This step should be initiated by stakeholders at the fifth stakeholder group meeting. The stakeholders choose the scenario based on appraisals prepared by experts. The co-ordinator (with the experts' assistance) writes up the strategy draft document, based on the stakeholder choices, and presents it for consultation and revision.



When all scenarios are appraised, the stakeholders should select the most cost-effective and acceptable scenario that complies with legal, technological, environmental and social requirements. Cost-effectiveness refers to the lowest cost per tonne (or the highest NPV and IRR value) for the desired level of service or management. Cost-effectiveness may involve a high investment cost with a low operating cost, or a low investment cost and a relatively high operating cost. Choices require that such differences be considered locally as a function of the financial resources available and projected user charges. For example, some cities may prefer a low-investment option with high potential to create jobs.

This stage of scenario selection should be iterative, in that a rough estimate of potential costs should be taken into account. If costs seem excessive and not affordable for the city, the scenario should be downgraded and set at an affordable level, as long as the proposed systems provide minimum environmental and safety measures that meet local regulatory requirements. An example of a simplified evaluation matrix is presented in Figure 4.

Usually, the decisive role in the scenario selection is played by the financial appraisal (NPV, IRR and unit cost per tonne). However, in a situation where the unit costs per tonne of the appraised scenarios are very similar, the additional appraisal methods (see Figure 4) may decide the scenario. Appendix 4 presents an illustration on selecting strategic scenarios for waste management.

	Scenario 1 - Landfilling	Scenario 2 - Incineration
legal compliance	full	full after upgrading technology
suitability of technology	yes	yes, but conditions will deteriorate when more waste is diverted to recycling and reuse
unit cost (includes all ancillary facilities)	\$27/tonne (likely to rise with increasing rate of landfill tax)	\$58/tonne
IRR value	1.2%	-8.4%
environmental and social impacts	negative impacts can be mitigated at relatively low cost	few negative impacts are identified
need for educational campaigns	substantial	limited
decision	go ahead	abandon

Figure 4. An example of an evaluation matrix for selecting a strategic scenario.

6 How to Make it Happen? Final Phase

This chapter provides guidance for the concluding phase of the strategy planning process. Responsibility for the final phase lies with the project co-ordinator, external experts and the stakeholders. If the stakeholder process was applied and the methodological steps were followed, official approval of the waste management strategy should be relatively straightforward. However, the strategic planning process does not end when the documents are completed and officially approved. The siting and design process follow. Implementation, monitoring and evaluation follow strategy preparation and eventually lead to cyclic revision of the strategy.

6.1 Drafting of Long-Term Strategy Document and Short-Term Action Plan

Drafting the strategy and the action plan is normally undertaken by experts (internal or external) in close consultation with the stakeholders. Interested stakeholders should be invited to draft specific parts of the plan or work alongside the experts. The draft strategy and action plan should be sent to stakeholders for consultation. The sixth stakeholder group meeting should discuss and amend the draft documents.



The strategy presents the results of all the methodological steps discussed above. It should be written clearly and focus on the most important findings. Tables and graphs are usually very helpful in summarising the results. The strategy is often prepared for a period of at least 12 years. The document should contain:

- objectives of the strategy, vision statement and time horizon of the strategy;
- brief description of the methodology applied in developing the strategy;
- description of the waste management status quo in the city;
- list of problems, pointing out priority problems;
- list of priority objectives;
- description of scenarios;
- results of scenario appraisal;
- presentation of favourable scenario, focusing on its likely effects, costs and funding options.

The action plan and financial plan are the final output of the strategic planning process, in terms of preparation of documents. Both are either integrated with the strategy document or form a separate document. To make the strategy specific and implementable each strategic objective should be developed further into a list of actions that are necessary to implement the objective. The action plan is usually prepared for four years. It is presented as a matrix and specifies clearly:

- responsibility for actions;
- time frames;
- costs (investment, operational, soft projects);
- funding sources;
- human resources requirements;
- performance monitoring criteria.

Types of actions include:

- infrastructure actions: construction of landfill sites, sewage treatment plants, etc.
- planning studies: feasibility study, waste management strategy, etc.
- monitoring and enforcement;
- training to increase institutional capacity.

Illustration of a long list of actions:

Objective: Increase separate collection and recycling at source to 25 per cent of household waste volume by 2007.

Actions:

- identify suitable residential areas;
- undertake survey of households;
- estimate potential stream of sorted and recycled materials;
- identify markets for recycled materials;
- reach agreement with waste contractor and recycling centre;
- undertake promotional campaign;
- introduce system of economic incentives for recycled materials;
- purchase and distribute composters;
- introduce dual containers for dry and wet waste;
- introduce containers for collection of glass, batteries, plastic, paper, textiles;
- organise 'bring sites' for materials that can be reused (e.g., cloth, textiles);
- introduce collection system for bulky waste;
- introduce label information system for each recycling container;
- introduce flexible and selective system of waste collection.

6.2 Preparation of Financial Plan

Drafting the financial plan is normally undertaken by internal or external experts. The draft financial plan should be sent out to stakeholders for consultation. Discussion about the financial plan should occur at the sixth stakeholder group meeting.



Drafting the financial plan requires specific expert knowledge and experience. It helps translate objectives into quantitative, technical targets and calculate the costs and expenditure required to meet these targets. In essence, a financial package should be prepared that addresses the financial needs of the strategy and closes all financial gaps. The results of the scenario appraisal - costs, benefits, cash flow, NPV, IRR and cost/tonne values - should be used in setting the financial plan. There are two potential approaches. An indicative financial plan can be prepared for the planned duration of the strategy (e.g., 12 years), and a short-term financial plan can be prepared to match the action plan.

The first step in drafting a financial plan is assessing the financial standing of your city. Such an assessment may also be provided in the status report. To check the financial standing and evaluate future prospects you will need to:

- Assess the financial situation - review the accounting documentation routinely produced by the city administration, i.e. cash flows and budget documentation.
- Try to identify any legal, social and other factors that may influence current and future financial standing. These may include changes in tax legislation, migration trends in the local community and industry development trends.
- Identify financial perspectives for the period to which you decide to apply the strategic planning approach, i.e. investment and operational costs, and revenue stream.
- Make an inventory of possible financing sources for various goals. These sources include increased user charges, revenue from the sale of recycled materials, private sector involvement, bank loans, environmental funds, international financing institutions (IFIs) and EU assistance funds.

Now you will need to divide the pool of available resources to allocate them to the specific measures. If the finances do not match the strategy or the action plan needs, the following measures can be taken:

- Raising revenues by, for example, gradually increasing user charges for waste collection, treatment and disposal;
- Taking out commercial loans, if the overall financial indicators are positive but cash flow problems appear at certain periods of time;
- Taking soft loans from sources such as National or Regional Environmental Funds;
- Applying for funding from EU sources (ISPA, PHARE, Structural and Cohesion Funds);
- Negotiating involvement of the private sector.

You will need to categorise the measures according to their commercial viability and socio-economic value. Financial and cost-benefit analysis of the specific projects will help you to decide which projects are relatively easy to implement using market forces, and which ones need additional support from subsidies and/or grants.



When the analytical work is completed, the financial plan is presented. The long-term financial plan usually shows a breakdown of investment and operational costs, benefits and cash flow. The short-term financial plan is usually presented as a matrix (see Figure 5) that lists all objectives and actions along with funding sources. The financial plan should demonstrate the funding status of each action and objective in percentages of funding secured and funding sought.

Financing sources [million x]							Total available [million x]*	Total cost [million x]	% se- cured funds
Public					Private				
	City's own re- sour- ces	Govern- ment subsi- dies	EU funding		Ear- marked funds	IFIs			
			ISPA	PHARE					
Objective 1									
Action 1.1	10	0	30	0	0	10	0	50	60
Action 1.2									
Action 1.3									
Objective 2									
Action 2.1									
Action 2.2									
etc.									
TOTAL									

* In the table, funds that are sought but not finally secured may be marked in italics. Donors often express preliminary interest in some projects but the final decision is pending up to the moment when all the project documentation is delivered. These elements may change in the course of revisions.

Figure 5: Illustrative matrix for four-year Indicative financing plan.

6.3 Implementation, Monitoring and Evaluation

The city administration normally takes the leading role in implementing the plan and monitoring progress. Independent progress evaluation should be undertaken at regular intervals (e.g., once a year). The stakeholder group should be convened at least once a year to review the progress of implementation and to advise how implementation could be strengthened.



Once the strategy, the action plan and the financial plan are prepared, reviewed by the stakeholders and adopted by the City Council, the implementation phase begins. Certain management arrangements need to be in place to ensure successful implementation.

These include:

- continuation of the project co-ordinator's involvement;
- continuous proactive approach of the stakeholder group;
- proactive approach of the organisations responsible for implementing actions;
- independent progress reviews;
- co-operation of the community;
- communication of results to the interested parties and to the public through media including newsletters, strategy website, publications, presentations and celebration of good results.

The local community should be kept interested in the implementation of the strategy. One approach is to communicate the results and to celebrate the achievements.



The implementation phase will involve drafting terms of reference, preparing designs and bills of quantities, preparing government cost estimates, advertising bid documents, tendering and contracting, and supervision of construction.

The implementation phase is integrated with progress monitoring arrangements that are based on a well-defined and measurable set of progress monitoring criteria. Monitoring criteria can include management criteria, financial and physical or environmental criteria. Examples of progress monitoring criteria include:

- timing - is the action implemented according to time schedule?;
- expenditure compared with expenditure expected in the financial plan;
- the level of operational costs against the predictions made in the strategy;
- meeting targets stipulated in the strategy (e.g., portions of waste being safely disposed, reduction of labour redundancy, rationalisation of collection routes, worker and vehicle productivity improvements, increased rates of recycling or composting, reduction of citizen complaints, shortened and improved response to complaints, improved record keeping on waste quantities and service deliveries, decreased unit costs);
- involvement of the private sector and increase in private sector investment;
- citizen participation in separation and recycling programs;
- enforcement of user charges (e.g., percentage of households paying user charges);
- volume of recycled materials;
- number of illegal dumpsites cleaned up;
- estimated number of citizens reached by awareness campaigns, and corresponding increase in satisfaction with service improvements and user costs;
- the level of customer satisfaction compared with the pre-strategy period.

Progress monitoring should be undertaken regularly to identify delays and stumbling blocks so that they can be properly addressed. It is a good practice for independent experts to review the progress annually. The annual progress reports should be provided to the stakeholders for comments before a stakeholder meeting is convened. The stakeholders should be given the opportunity to comment actively on implementation. Annual stakeholder meetings provide a good platform for reviews.

Experience with implementation builds over time and allows updates and revisions to be made. It is a good practice to make updates and revisions to the strategy after two to three years of implementation and not instantly when problems are spotted. Problems should instead be solved by improving management arrangements. It is a good practice to revise the strategy in line with the political cycle, that is, with municipal elections.

Revisions and updates require a new cycle of data collection. Hence, a new strategy cycle needs to be initiated, though some steps are simplified compared with the first cycle:

- problems and goals need to be revised because some may be out of date or already addressed, and others may arise from new legislation;
- the waste management option set in the strategy needs to be revised and new elements may be added;
- a new financial plan is required because funding sources are likely to be out of date.

The second strategy cycle usually requires less input from consultants than the first cycle because much experience and expertise is usually built in-house during the first strategy cycle.

Activity 10

Developing criteria for monitoring progress of the municipal solid waste management strategy

1. Select three alternative objectives: e.g., design and construction of a sanitary landfill, stimulation of home composting, and introduction of new recycling containers in a pilot area of your city.
2. Make a list of actions necessary to implement the objectives and develop specific progress monitoring criteria for each action, and more general monitoring criteria for each objective. Select or invent criteria which best reflect progress for each specific objective and action.
3. What differences do you see between:
 - progress monitoring criteria developed for the three different objectives?
 - progress monitoring criteria developed for objectives and for actions?



7 Concluding Remarks

One of the key messages of this guidebook is that strategic planning for waste management is a cyclic process. It does not finish with completion of the strategy document. Implementation needs to be monitored and improved. With experience in implementation, and when the time frame of the strategy and action plan are approaching their completion, it is a good practice to update the data to revise the plan or prepare new action and financial plans to address new challenges, such as new EU directives that have arisen during the implementation phase. This allows for continuous and cyclic improvement and flexibility in addressing new challenges. Many years are likely to be necessary to develop an advanced waste management system in your city.

Appendix 5 illustrates how strategic planning for waste management has evolved over the last 15 years in the Austrian city of Graz.

It is strongly advised that your city meets the minimum conditions before starting the strategic planning process for waste management. The conditions include:

Internal conditions:

- political commitment and support of the City Council for development and implementation of the strategy;
- realistic target funding for the solid waste management strategy identified and agreed in principle;
- part-time involvement of one person (project manager) over the whole duration of the strategy drafting process;
- well-defined and agreed-upon methodology and output;
- sufficient coverage of a range of data;
- logistical support of the City Council including rooms for stakeholder meetings, faxing and photocopying facilities.

External conditions:

- interest and active involvement of stakeholders;
- professional facilitator;
- support of technical experts, particularly for economic and technological assessment and the appraisal of options.

The process should not be launched before these criteria are met because this could cause frustration and disappointment among participants.

This guidebook recommends that a participatory stakeholder process, integrated with experts, conduct essential technical tasks and facilitate stakeholder involvement. It is likely to be a challenging task for the city administration to apply this method which requires a new way of thinking and making decisions in the City Council. However, the medium and long-term benefits (transparency, public ownership of the strategy and commitment to its implementation, reduced scope for protests) are worth taking the effort.

It is emphasised that certain strategic decisions such as the selection of key infrastructure facilities need to be taken at the central (municipal or multi-municipal) level, whereas other decisions, such as the choice of separate collection systems, should be decentralised in line with the subsidiarity principle.

It is further recommended to phase in as quickly as feasible the implementation of the EU waste management requirements in the strategy development, because these are or will soon be binding through your national legislation.

Adequate and reliable data coverage should support the creation of the strategy. The quality of choices made in your strategy will directly depend on the quality of the data that support them.

Setting priorities is a key stage of making a strategy. It is important to give much attention to this stage by applying both expert and participatory priority-setting techniques.

The later stages of strategy making - appraisal of scenarios, drafting of long-term strategy, short-term action plan and financial plan - require significant expert input. Good co-ordination between expert input and stakeholder input is required to develop a successful municipal solid waste management strategy. This is possibly the most difficult part of the process.

Figure 6 summarises the various inputs, responsibilities and timeframes for making the strategy. It is an illustration of how the process can be managed. In reality, the process can be modified: the methodological steps can be combined, and the responsibilities and timeframes may change depending on the experience and ability of your City Council.

We hope that this guidebook will assist in taking you through the first round of the strategic planning process. The experience gained in your city when going through the process will be of great interest to others. Please make sure that you share your experience and observations with other cities.

Methodological step	Co-ordinator	Stakeholder group	Technical experts	Official meetings	Timeframes
Establishing the project	Part-time availability over whole project duration; securing political support; preparing methodology; securing logistical support	None	Preparing methodology	None	Month 1
Setting the stakeholder process	Identifying stakeholders; seeking official approval of stakeholder group; inviting stakeholders to process	None	None	None	Month 2
Collecting data	Identifying data gaps; collecting and analysing missing data	Could assist in data collection	Assistance in data collection and analysis if needed	None	Month 1 to 12 (depends on data coverage)
Drafting status report	Drafting status report	Report review	Assistance in drafting status quo report	First stakeholder group meeting (SGM)	Month 3
Identifying and grouping problems	Preparing first Stakeholder group meeting (SGM); dissemination of results	Participation in first SGM, problem identification	Facilitation of the first SGM; providing expert advice		Month 4
Generating objectives	Preparing second SGM; dissemination of meeting results	Participation in second SGM; generation of objectives	Facilitation of second meeting, providing expert advice	Second SGM	Month 5
Prioritising objectives	Preparing third SGM; dissemination of materials and meeting results	Participation in third SGM; setting priority objectives	Facilitation of the third SGM; setting expert priorities	Third SGM	Month 6
Developing alternative scenarios to meet priority objectives	Preparing fourth SGM; dissemination of materials and meeting results	Participation in fourth SGM; setting guidelines for scenario setting, checking against priority objectives	Providing options for scenario setting; facilitation of fourth SGM	Fourth SGM	Month 7
Appraisal of scenarios	Co-ordination of the appraisal process; liaising with stakeholders	Providing input and insight into the appraisal process	Undertaking appraisal (technology; unit cost, economic, environmental, etc.)	None	Months 8-9
Selection of scenario	Preparing fifth SGM; Dissemination of materials and handling comments	Participation in fifth SGM Selection of scenario	Technical and economic support to SGM; facilitation of fifth SGM	Fifth SGM	Month 10
Drafting Strategy and Action Plan	Drafting of strategy and action plan; preparing sixth SGM; dissemination and handling comments	Participation in sixth SGM	Drafting strategy and action plan; facilitation of sixth SGM	Sixth SGM	Months 11-13
Drafting financial plan	Co-ordination of financial plan drafting; dissemination handling comments	Participation in sixth SGM	Drafting action plan facilitation of sixth SGM	Sixth SGM	Months 11-13
Implementation, monitoring and evaluation	Monitoring progress; problem solving; liaising with stakeholders; convening annual SGM	Participation in monitoring, evaluation and revision of strategy	Undertaking progress reviews	Annually (recommended)	Months 13+

Figure 6. Illustration of the inputs, responsibilities and timeframes applied in the Municipal Waste Management Strategy Making.

APPENDIX 1

BIBLIOGRAPHY AND RECOMMENDED FURTHER READING

Audit Commission (1997). *Waste Matters. Good practice in Waste Management*. Audit Commission, London.

Bass S., Dalal-Clayton B. and Pretty J. (1995). *Participation in Strategies for Sustainable Development*. IIED London.

Cointreau-Levine S. and Gopalan P. (2000). *Guidance Pack. Private Sector participation in municipal solid waste management*. Swiss Centre for Development Cooperation in Technology and Management.

Commission of the European Communities (1997). *Guide to the approximation of European Union environmental legislation*. European Commission, Brussels.

Environmental Resources Management (2001). *Strategic Planning Guide for Municipal Solid Waste Management*. The World Bank publication, Washington.

Environmental Resources Management (1998). *Waste Management Strategy for Northern Ireland*. Government of Northern Ireland, Belfast.

Markowitz P. (2000). *Guide to Implementing Local Environmental Action Programs in Central and Eastern Europe*. The Regional Environmental Centre and the Institute for Sustainable Communities, Szentendre, Hungary.

McDougall F. *et al* (2000). *Integrated solid waste management: a life cycle inventory*. Blackwell Science, Oxford.

OECD (1995). *The economic appraisal of environmental projects and policies. A practical guide*. Organisation for Economic Co-operation and Development, Paris.

Phare (1997). *Environmental project development manual. A guide to project identification and preparation in Central and Eastern Europe*. European Commission, Brussels.

Phare (1999). *Handbook on the Implementation of EC Environmental Legislation*. European Commission, Brussels.

Scheinberg A. (editor) (2001). *Integrated Sustainable Waste Management. A set of Five Tools for Decision-makers. Experience from the Urban Waste Expertise Programme (1995 – 2001)*. The Waste publication.

World Bank (1994). *Environmental Action Programme for Central and Eastern Europe*. World Bank, Washington.

APPENDIX 2

SAMPLE QUESTIONNAIRE SURVEY EXPLORING CITIZENS' SATISFACTION WITH THE MUNICIPAL WASTE MANAGEMENT SYSTEM

General comments:

- The survey is designed to cover non-hazardous waste.
- Please indicate a deadline for returning the questionnaire.
- Please explain in a cover letter attached to the questionnaire the purpose of the questionnaire: to explore how the residents perceive the waste management system in the town, find out about their preferences for future improvements, their willingness to be actively involved, etc. You should also mention that the questionnaire results will be used to provide statistical feedback for the waste management strategy currently under development in your town.
- Please make sure that the final version in the national language leaves enough space for responses.
- Please enclosed a stamped envelope with a return address with the questionnaire.
- At least 300 questionnaires should be sent out to ensure sufficient sample size, assuming about 30 per cent return rate this gives about 90 questionnaires for further analysis.
- The selection procedure should ensure that we get samples from various housing estates (blocks of flats, residential houses, etc.), various income levels, various educational backgrounds. These goals can be achieved with a random sample within pre-specified target groups.

TARGET GROUP: HOUSEHOLD WASTE PRODUCERS

1. Do waste collection and disposal services in your city meet your expectations? Please give your opinion in the scale one to five with one meaning 'they do not meet my expectations at all' and five meaning 'they fully meet my expectations'.
2. What waste tariff do you pay now? Are you satisfied with the level of tariffs? Please indicate whether you find them:
 - ☐ excessively high
 - ☐ too high
 - ☐ satisfactory
 - ☐ too low
 - ☐ other
3. Are you satisfied with the frequency of communal bin transfer? Please, indicate whether you find the collection:
 - ☐ too infrequent
 - ☐ satisfactory
 - ☐ too frequent
 - ☐ other
4. Are you satisfied with the selective collection arrangements? (*Applies when the system is in place*)
 - ☐ yes
 - ☐ partly
 - ☐ no (please, indicate why)
 - ☐ other comments
5. Do you sort your waste and dispose it in special containers for: (*if such opportunity is not available in your city, would you be willing to sort your waste and dispose it in special containers for*):

glass	<input type="checkbox"/> Yes	<input type="checkbox"/> No
paper	<input type="checkbox"/> Yes	<input type="checkbox"/> No
plastic	<input type="checkbox"/> Yes	<input type="checkbox"/> No
batteries	<input type="checkbox"/> Yes	<input type="checkbox"/> No
metal	<input type="checkbox"/> Yes	<input type="checkbox"/> No
textiles	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6. What, in your view, are the main waste management problems in your city? Please state them briefly.
7. Do you find illegal dumping a problem in your city? If yes, please state the reasons.
8. How do you react when you see incidents of illegal dumping? Please describe.

9. Cleaning up of illegal dumpsites cost your city budget last year ____? *(Value to be indicated by sender of questionnaire in advance)* Who in your view should cover these expenses?
10. Are you in a position to compost your organic waste (garden, allotment)? If yes, do you do that?
11. If your city were to introduce selective collection of organic waste (in separate containers or bags) for municipal composting, would you participate?
12. Would you be willing to pay more for improved waste management services?
- ☐ yes
 - ☐ no
 - ☐ don't know
 - ☐ other comments
13. Would you be interested to learn more about waste management, environmental impact of waste, and various ways of minimising and treating the waste stream?
14. If so, what would be your favoured method of increasing your knowledge (please tick off if yes)?
- ☐ open seminars
 - ☐ brochures distributed to residents
 - ☐ pilot waste minimisation projects
 - ☐ waste reduction campaigns
 - ☐ exhibitions presenting good practices in waste minimisation, sorting and recycling
 - ☐ educational programs at schools
 - ☐ other (please specify)
15. Would you be interested in being more actively involved in decision-making process on waste management? If yes, what would be the best way of doing it?
16. Would you be interested in being involved in the Cities of Change project on a voluntary basis by taking part in seminars, meetings and expressing your views on reports and proposals sent to you for comments? If yes, please include your name, address and telephone number.

For statistical reasons, please indicate:

17. your sex ☐ Male ☐ Female
18. your age
19. category of household:
- ☐ flat in a block of flats
 - ☐ apartment in a multifamily house (2 floors)
 - ☐ detached or semi-detached house with a garden
 - ☐ other (please, specify)

20. Which company have you contracted for waste collection (not relevant for cities with municipal collection system)?
21. In the past year, have you changed your waste collection company?
22. If so, what was the reason for this change? Please indicate.
23. Your average monthly income per household member (national average: ... per cent)⁹
- ☐ up to 50 per cent of national average
 - ☐ 50 per cent to 100 per cent of national average
 - ☐ more than 100 per cent of national average
24. Your level of education:
- ☐ primary
 - ☐ vocational school
 - ☐ a level
 - ☐ university

Thank you for your time and interest.

Please return this questionnaire by _____ (date) in the envelope attached (no stamp required), or pass it on to your City Council.

⁹ Here, sender of questionnaire should calculate and indicate value of national average for readers' information.

TARGET GROUP: BUSINESS WASTE PRODUCERS

1. Please indicate the types and quantities of waste produced by your company.

category	quantity
category	quantity
category	quantity
2. Has your waste stream increased or decreased in the past three years?
 - ☐ increased
 - ☐ decreased
 - ☐ remained stable
3. Do you expect that your waste stream will increase or decrease in the next two years?
 - ☐ it is likely to increase
 - ☐ it is likely to decrease
 - ☐ it is likely to remain stable
 - ☐ other comments
4. Do you sort and/or recycle your waste such as:

Glass	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Paper	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Plastic	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Metal scrap	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Cooling agents	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Solvents	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Oils	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Textiles	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Other (please, indicate)		
If not, please state the reason		
5. Do you have an appropriate intermediary storage facility for your waste that is subject to sorting, recycling or re-use (other than for hazardous waste)?
6. Do you treat non-hazardous waste within your facilities? If yes, please indicate what methods are used, the category of waste, and the percentage of waste within the category undergoing treatment.
7. Do you landfill or backfill waste within your facilities?
8. Is there a person or unit within your company specifically responsible for waste management?
9. Is your company registered, or does it intend to be registered, under the ISO 14000 scheme?
10. Do you have capacity in your company to increase sorting and recycling of waste?

11. What are the key challenges for better waste management in your company?
- | | | |
|--|------------------------------|-----------------------------|
| low profitability of improved waste management | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| lack of waste management facilities | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| lack of market for recycled waste | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| lack of financial incentives | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| financial constraints of your company | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| poor legislation | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| poor monitoring and enforcement of legislation | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| frequent changes in legislation | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| lack of municipal waste management strategy | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| other (please, indicate) | | |
12. What factors would determine your decision to improve waste management practice within your company:
- | | | |
|------------------------------|------------------------------|-----------------------------|
| cost saving | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| compliance with legislation | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| better image of your company | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| other (please, specify) | | |
13. Would you be willing to provide your City Council with information on your volume of generated waste (for instance once a year) so that better waste strategies are developed for the future?
14. Do waste collection and disposal services in your city meet your needs and expectations?
Please give your opinion on a scale from one to five with one meaning 'they do not meet my needs and expectations at all' and five meaning 'they fully meet my needs and expectations'.
15. Is the system of waste collection flexible enough in:
- ☐ frequency of collection?
 - ☐ reliability?
 - ☐ quality of work?
 - ☐ size of containers?
 - ☐ other?
16. What, in your view, are the main waste management problems in your city?
Please state briefly.
17. What waste tariff do you pay now? Are you satisfied with the level of tariffs?
Please indicate whether they are:
- ☐ excessively high
 - ☐ too high
 - ☐ satisfactory
 - ☐ too low
 - ☐ other
18. Would you be willing to pay more for improved waste management services that fully meet your expectations?

19. Do you feel the business sector in your city is adequately represented and involved in decision-making on the future waste management in the city? Please comment briefly.
20. Would you be interested in being more actively involved in decision-making processes on waste management? If yes, please state what would be the best means for your involvement.
21. Would you be interested in using the methods below to learn more about waste management, environmental impact of waste, and various ways of minimising and treatment of the waste stream? (Please, tick off if yes.)
- ☐ open seminars
 - ☐ brochures distributed to businesses
 - ☐ pilot waste minimisation projects
 - ☐ waste reduction campaigns
 - ☐ exhibitions presenting good practices in waste minimisation, sorting and recycling
 - ☐ educational programmes about waste, organised for employees
 - ☐ other (please specify)
22. What would be your favoured method to increase waste management awareness within your company?
23. Would you be interested in being involved in the Cities of Change project on a voluntary basis by taking part in seminars, meetings and expressing your views on reports and proposals sent to you for comments? (A brief description of the project is attached.) If yes, please include your name, address and telephone number.

For statistical reasons, please indicate:

24. your position within the company:
25. the business sector you operate in, and your key products:
26. approximate number of employees in your company:
27. form of ownership of your company:
28. what company have you contracted for your waste collection?:
29. have you changed your waste contractor in the past year? If so, please indicate why.

Thank you for your time and interest.

Please return this questionnaire by _____ (date) in the envelope attached (no stamp required), or pass it on to your City Council.

APPENDIX 3

EU WASTE MANAGEMENT LEGISLATION

EU-ENVIRONMENTAL LEGISLATION BACKGROUND

Directives form the majority of EU environmental legislation. Directives are designed to impose obligations on Member States, while providing enough flexibility to enable Member States to implement the requirements within their own legal and administrative systems.

There are several different types of Directives that comprise EU environmental legislation. Two of these – Framework Directives and Daughter Directives – will be discussed in this manual.

Framework Directives set out general principles, procedures and requirements for legislation governing the air, water and waste sectors. Sections pertaining to Framework Directives describe the steps that national level institutions must take to implement laws once they are transposed into national legislation. They also serve as background for measures that regional and local authorities must take to comply with the legislation.

Daughter Directives set specific requirements – for example, pollutant-specific emission limits, technical specifications for infrastructure, or criteria for monitoring and reporting – which Member States must use to regulate each sector of the environment, as set forth in the Framework Directives. In most cases, it will be the Daughter Directives that set forth the measures required of regional and local authorities to achieve EU environmental compliance. Sections on Daughter Directives in this manual provide the general requirements or parameters set forth in each Directive, plus the specific requirements that regional and local authorities must focus on to plan for and achieve compliance.

ROLES OF LOCAL/REGIONAL AUTHORITIES

EU legislation recognises that most environmental problems are of a regional or local character. Municipalities are usually responsible for providing local services that control many sources of pollution. These services include water, sewerage, and municipal waste disposal. As the following sections on specific Directives will point out, the regulation and monitoring of pollution and environmental quality fall to each Member State on a regional basis.

As discussed above, Member States can incorporate the requirements of EU Directives into their own administrative and legal systems. As a result, the Directives specify that implementation, regulation, and enforcement must be handled by ‘competent authorities’, which shall be designated by the Member States. In many countries, these competent authorities will be local/regional authorities. The types of competent authorities required to implement the legislation vary for air, water, and waste sectors. These will be described in more detail in the Directive-specific sections to follow.

THE FRAMEWORK DIRECTIVE ON WASTE

Official Title: Council Directive 75/442/EEC on Waste, as amended by Council Directive 91/156/EEC.

INTRODUCTION

The Framework Directive on Waste establishes a framework for waste management across the European Union. It also provides a common definition of waste:

“Waste is any substance or object in the categories set out in Annex I of the Waste Framework Directive which the holder discards or intends or is required to discard.”

MAIN OBJECTIVES OF THE DIRECTIVE

The Framework Directive on Waste:

- calls for Member States to take necessary measures to ensure that waste is recovered or disposed of without risk to the air, water or soil, without creating a nuisance in the form of odours or noise, and without adversely affecting the landscape.
- requires Member States to establish an integrated waste management strategy based on the principles stipulated in the Directive, including clearly defined time scales and responsibilities.
- requires Member States to issue permits to companies engaged in waste disposal or recovery. The permits must include requirements regarding such matters as disposal techniques and methods, sites, technical requirements and security precautions.
- establishes provisions for inspection and monitoring of waste management in the Member States and lays down requirements for reporting to the European Commission and to the public.

KEY PRINCIPLES

Waste Management Hierarchy and Principles

The Directive establishes a waste management hierarchy which identifies waste management options based on their desirability. The most desirable is waste prevention and minimisation of waste generation. This is followed (in descending order of priority) by:

- prevention and minimisation of waste generation;
- re-use of waste;
- recycling of waste;
- recovery of waste;
- use of waste as a source of energy;
- incineration without energy recovery;
- landfilling.

Although landfilling is considered the least desirable waste management option, it should be recognised that landfilling is a necessary component of the waste management cycle.



The Directive also requires governments to apply the following principles in waste management:

- the principle of best available technology not involving excessive costs (this relates to establishing a network of waste disposal and treatment facilities);
- the principle of proximity of treatment and disposal to the source of waste;
- the principle of self-sufficiency in waste disposal (reliance on national waste disposal/treatment facilities to avoid trans-boundary movement of waste);
- application of the polluter pays principle to the disposal of waste to ensure that the cost of waste disposal is borne by the producer holder;
- duty of care for producers of waste.

CORRESPONDING DIRECTIVES

The Waste Framework Directive provides a planning and institutional framework to guide implementation of the waste sector Directives. The related Daughter Directives include:

- Directive on the Landfill of Waste 99/31/EC;
- Directive on the Incineration of Waste 2000/76/EC;
- Packaging Waste Directive 94/62/EC;
- Sewage Sludge Directive 86/278/EEC;
- Hazardous Waste Directive 91/689/EEC;
- Batteries Directive 91/157/EEC;
- Directive on the Disposal of PCBs and PCTs 96/59/EEC;
- Waste Oil Directive 75/439/EEC.

HOW THE DIRECTIVE WORKS

STEP 1

Member States (and Candidate Countries) designate competent authorities at the appropriate levels (national, regional or local) for the tasks required by the Directive (Article 6).

STEP 2

Member States establish an integrated waste management strategy at the national government level, incorporating the waste management hierarchy and principles set forth in the Directive.

STEP 3

Member States assess existing disposal installations to determine what additional infrastructure is needed to establish an integrated and adequate network of disposal installations, in accordance with Article 5.

STEP 4

Member States prepare national waste management plans (Article 7). The waste management plans shall specify *inter alia* the types, quantity, and origin of waste to be recovered or disposed of, general technical requirements, waste management arrangements for specific types of waste and suitable disposal/treatment installations. Key stages in preparing the waste management strategy include:

- definition of scope and goal;
- baseline study including analysis of the existing situation and a forecast of future waste stream;
- identification of problems;
- setting of strategic objectives;
- identification of options and scenarios to achieve the objectives;
- appraisal, prioritisation and selection of the most desirable options and scenarios;
- financial appraisal and identification of funding sources;
- allocation of responsibilities and timeframes of implementation;
- setting indicators to measure progress.

STEP 5

Member States establish measures to regulate and monitor waste management, including:

- systems and procedures for issuing permits to waste management facilities running disposal and recovery operations listed in Annex II A and B of the Directive (Article 9);
- systems and procedures to inspect waste management facilities;
- training for waste regulators and inspectors.

STEP 6

Member States establish procedures for consultation with stakeholders before introducing new waste regulations and procedures and develop a communications program to encourage waste minimisation among producers.

REPORTING

Member States report to the European Commission on:

- measures taken to implement the waste hierarchy;
- national waste management plans;
- measures taken to prevent the movement of waste not in accordance with waste management plans;
- measures taken to implement the Directive;
- information on hazardous waste handlers, including company names and addresses, as well as the types and quantities of waste.

Reported information shall be made available to the public.

Implementation requirements for local/regional authorities

National authorities hold most of the implementation responsibilities. Although the Directive does not specifically require that Member States delegate solid waste management responsibilities to regional/local authorities, this will continue to be the practice in most candidate countries. It is, therefore, important for regional/local authorities to understand the requirements of the Framework Directive, particularly in relation to infrastructure needs, planning and public participation.

INFRASTRUCTURE NEEDS

Member States are responsible for establishing an integrated and adequate network of waste disposal and treatment installations. The waste installations shall utilise the best available technology not involving excessive costs (Article 5). The network of installations shall provide self-sufficiency in waste disposal and shall reflect the principles of waste management.

Member States are responsible for assessing existing waste disposal and treatment installations to determine what additional infrastructure is needed to establish an integrated and adequate network of waste disposal/treatment installations.

PLANNING AND STRATEGY PREPARATION

Following the establishment of an integrated waste management strategy, the Directive obliges Member States to prepare waste management plans based on the principles incorporated in the Directive. The Directive calls for strategies and waste management plans at the national level without reference to waste management plans at the regional or local level. However, well-designed municipal or regional waste management plans will follow the philosophy of waste management incorporated in the Directive.

PUBLIC PARTICIPATION REQUIREMENTS

The Directive does not specifically require public participation. The formal requirements for public consultation are related mostly to siting procedures for new waste disposal/treatment facilities. These are, however, regulated by the land use permitting system and Environmental Impact Assessment legislation.

In addition, civic organisations ought to be involved in designing national (and local) waste management plans, although the Directive does not specifically require this.

Checklist to identify non-compliant situations relevant to local/regional authorities

- Has a municipal waste management plan been prepared? If so, does it take into account the waste management hierarchy and principles stipulated in the Directive (i.e., moving away from landfilling to re-use and recycling of waste)?
- Has an assessment been made to establish whether the existing waste disposal/treatment installations create risk to the air, water or soil, or create a nuisance in the form of odours or noise?
- Do existing waste disposal/treatment facilities utilise the best available technology not involving excessive costs, and do they reflect the waste management hierarchy stipulated in the Directive?
- Are waste management companies granted operating permits?
- Is the municipality promoting waste prevention and minimisation?

Recommendations for local/regional authorities in addressing non-compliance

Although the Directive does not specifically address municipalities or local level administration (leaving the division of national responsibilities to the discretion of Member States), it is recommended that municipalities take the following into account:

- Enforce the waste management hierarchy and principles incorporated in the Directive. In particular, local authorities can encourage minimisation of waste generation through incentives and education. They can also encourage recycling, composting and recovery by providing a separate collection system and recovery/recycling facilities for recyclable waste.
- Monitor any changes in the division of responsibilities between the national and local levels in relation to infrastructure requirements, waste management planning, and targets for recycling and minimisation.
- Monitor changes in the permitting requirements for waste operators and waste disposal/treatment facilities.

DIRECTIVE ON LANDFILLING OF WASTE**Official Title:** Council Directive 99/31/EC on the Landfilling of Waste**INTRODUCTION**

The Directive on the Landfilling of Waste aims to prevent or reduce the negative impacts of landfilling on the environment and human health. The Directive places significant restrictions on the way a landfill may be used for waste disposal, including technical conditions for design and operation, monitoring and closure and restrictions on the types of waste that can be landfilled. The deadline for current Member States for achieving full compliance with the technical requirements for the design, operation and after-care of landfill sites is 2009.

MAIN OBJECTIVES OF THE DIRECTIVE

The main goals of the Directive on the Landfilling of Waste include:

- reduce both the amount and toxicity of landfilled waste;
- set standards for the design and operation of existing and new landfills;
- encourage pre-treatment of waste before it is landfilled;
- prevent the mixture of hazardous waste with municipal waste;
- ban the landfill disposal of used tyres (whole or shredded), healthcare waste and flammable or liquid waste.

The Directive sets targets for the total quantity of biodegradable waste sent to landfills (in order to reduce methane emissions and thus reduce the impact on the ozone layer). Member States are obliged to reduce 1995 levels of biodegradable waste sent to landfills to 75 per cent of weight by 2006, 50 per cent by 2009 and 35 per cent by 2016.

Under the Directive on Landfilling, prices for landfill disposal must cover the cost of closure, recultivation and aftercare for at least 30 years.

***Implementation requirements for local/regional authorities***

Waste management is one of the major responsibilities of municipalities. It is, therefore, foreseeable that the obligation to comply with the Directive on Landfilling will be shifted, to a large degree, to local and regional authorities.

The central government is responsible for transposing technical standards and policy targets into the national legislative framework, setting economic instruments that help achieve targets set in the Directive, and introducing provisions that allow closure and after-care costs to be included in landfill fees. The government shall establish realistic timeframes for targets. The government shall also assist local authorities to identify which existing landfill sites do not comply with the technical requirements of the Directive.

Ultimately, local authorities must:

- upgrade or close existing landfill sites that do not comply with the minimum technical standards set by the Directive (Articles 8,14, and Annex I);
- construct new landfill facilities;
- introduce stringent monitoring systems for both operational and closed landfills;
- establish separate waste collection systems and composting facilities to achieve targets for reduction of biodegradable waste sent to landfills;
- provide facilities for materials no longer permitted to be landfilled, including tyres, healthcare waste, flammable waste and liquid waste;
- issue new permits for all existing landfills (with particular attention to the financial security needed for management and after-care of the site).

Deadlines for implementation by Candidate Countries will depend on the outcome of accession negotiations (i.e., the lengths of transition periods). Most likely, however, they will be extended beyond the deadlines currently applicable to Member States, bearing in mind that Member States were given 10 years to comply with the technical requirements for landfill sites.

Permitted landfill operators carry certain responsibilities. These mainly relate to preparing conditional plans for landfill sites, annual reporting on types and quantities of waste disposed in the landfill, results of monitoring programmes and notification of the refusal to accept any waste, as well as the maintenance, monitoring and control of the landfill after closure.

INFRASTRUCTURE NEEDS

The Directive has a number of infrastructure implications. They relate particularly to technical standards for landfills and targets for reducing the amount of biodegradable waste sent to landfills. They are likely to result in significant costs. The key requirements include the following:

- Waste shall be treated before landfilling. Thus, various waste treatment facilities need to be built. The selection of facilities falls to the discretion of the competent authorities, but it shall follow the waste management hierarchy incorporated in the Waste Framework Directive.
- Co-disposal (mixing of hazardous and municipal waste in the same landfill) is prohibited. Separate collection and/or sorting systems and treatment/disposal facilities must be provided to comply with this requirement (this relates, for instance, to batteries, pharmaceuticals and electronic waste).
- Disposal of tyres, healthcare waste, flammable waste and liquid waste is no longer allowed at landfills. Separate collection systems and treatment/disposal facilities must be established to redirect these types of waste from landfills.
- Methane from existing and new landfill sites must be collected and flared off if it cannot be used for energy generation. Methane collection and utilisation systems must be put in place in all landfill sites.
- A leachate collection system and treatment facility must be provided at all landfills.
- Composting facilities must be utilised to achieve targets for reducing biodegradable waste landfilled.

PLANNING AND STRATEGY PREPARATION

The central government is required to develop a strategy for achieving targets for reducing biodegradable waste sent to landfills. It is likely that the government will direct local/regional authorities to prepare similar plans.

Operators of existing landfills shall prepare conditional plans for the sites. The conditional plans will help the competent authorities to determine whether existing sites may continue to operate, or whether they shall be refused a permit to continue operating.

REPORTING

The reporting requirements of this Directive are relatively complex. Member States must report on implementation of the Directive to the Commission every three years, based upon a questionnaire or outline drafted by the Commission. Reporting will require Candidate Countries to gather data on the types and proportions of waste going to landfills, the origins and producers of waste, hazardous waste landfilling and other issues. Reporting systems and databases must be prepared. Local/regional authorities will likely be required to ensure that landfill operators report their data.

PUBLIC PARTICIPATION REQUIREMENTS

Formal public participation requirements relate to the siting procedure for new landfill sites. These are stipulated within regulations on planning and environmental impact assessment. Public participation is, however, also strongly advised in drafting strategies for reducing biodegradable waste sent to landfills.

Checklist to identify non-compliance relevant to local/regional authorities

- Do the landfill sites under your jurisdiction (and, consequently, the operating permit system) comply with the technical requirements of the Directive on Landfilling?

Check in particular:

- Are there adequate methane collection and utilisation systems in place at landfills in your jurisdiction?
- Are there adequate leachate collection and treatment systems?
- Is there appropriate fencing?
- Is waste treated prior to disposal at landfills?
- Is waste landfilling the only method of waste disposal in your municipality?
- Is co-disposal of municipal waste and hazardous waste permitted?
- Are tyres, healthcare waste, flammable waste and liquid waste disposed at landfill sites?
- Is composting of biodegradable waste undertaken in your municipality?
- Are the costs of closure, management, and after-care included in landfill fees?
- Is there regular monitoring of the types and quantities of waste at landfills? Are there regular reporting arrangements?

Recommendations for local/regional authorities to address non-compliance

- Assess the landfill facilities under your jurisdiction to check whether they comply with the technical requirements of the Directive on Landfilling. If they do not, check the feasibility of either upgrading existing sites or closing down existing sites and constructing new sites.
- Make sure that any planned landfills fully comply with the technical requirements of the Directive.
- Introduce regular monitoring of quantities and types of waste deposited at landfills.
- For Candidate Countries, be aware of the transition period set during accession negotiations that determine when full compliance with the technical standards of the Directive will be mandatory.
- Monitor the government's approach towards reducing biodegradable waste. Two scenarios are envisaged: Either equal reduction figures are imposed on all municipalities, or certain quotas are allocated to each municipality so that a national target is reached (the latter approach would allow flexibility and acknowledge differences among municipalities depending on their infrastructure needs).
- Introduce educational campaigns and encourage the participation of stakeholders in order to reduce the landfilling of biodegradable waste.
- Create special budgetary arrangements which will be needed to ensure that present landfill fees are reserved for after-closure expenses.

DIRECTIVE ON THE INCINERATION OF WASTE

Official Title: Council Directive 2000/76/EC of 4 December 2000 on the Incineration of Waste

INTRODUCTION

This recently adopted Directive provides a single legislative framework for the incineration and co-incineration of non-hazardous and hazardous waste. It repeals Directive 89/429/EEC and 90/369/EEC on the Prevention and Reduction of Air Pollution from Existing and from New Waste Incineration plants, as well as Directive 94/67/EC on the Incineration of Hazardous Waste.

MAIN OBJECTIVES OF THE DIRECTIVE

The Directive lays down extensive and comprehensive requirements for the permitting procedures for incineration and co-incineration plants, technical and technological requirements for incineration facilities, monitoring requirements and ensuring public access to information.

The Directive requires that measurement equipment be installed to monitor the parameters, conditions and mass concentrations relevant to the incineration or co-incineration process (in accordance with Annex III of the Directive).

The Directive establishes limit values for air and water emissions from incineration and co-facilities. Specific limit values for air emissions are set in Annex II and Annex V of the Directive. Limit values for water discharges are specified in Annex IV.

Certain types of incineration and co-incineration plants are excluded from the scope of this Directive. These include facilities used exclusively for treating animal waste, vegetable waste from agriculture and forestry, waste from vegetable processing if the heat generated is recovered, wood and cork waste, radioactive waste and waste resulting from off-shore exploration of oil and gas resources.

Member States are obliged to comply with the Directive by 28 December 2002. The Directive applies to existing plants from 28 December 2005 and to new plants from 28 December 2002. Certain exemptions for SO_x and NO_x emissions can be granted until no later than 1/1/2008 (see Annex II of the Directive).

Implementation requirements for local/regional authorities

The Directive puts a number of obligations on “competent authorities”, and the operators/owners of incineration plants. Depending upon national conditions, either of these could be a regional/local authority.

The establishment of a competent authority for permitting, inspection, and enforcement of requirements for incineration and co-incineration facilities (as established by the Waste Framework Directive and the IPPC Directive) falls to the discretion of Member States.

The Directive requires that incinerators or co-incinerators do not operate without a permit and specifies the content of the application for a permit. The application shall include a description of measures guaranteeing that:

- the plant is designed, equipped, and it will operate following the requirements of the Directive;
- heat generated during the incineration process is recovered as far as is practicable;
- residues will be minimised, and their disposal will be carried out in accordance with national and Community legislation.

The permit granted by the competent authority to the incineration or co-incineration plant shall list specifically the categories of waste that may be treated, set the total capacity of the plant, and specify the sampling and measuring procedures for each air and water pollutant. In addition, if the permit is granted for incineration of hazardous waste, the permit shall specify the minimum and maximum mass flows, the minimum and maximum calorific values, and the maximum contents of pollutants such as PCB, chlorine, fluorine, sulphur, heavy metals and others.

Significant obligations are placed on the operators of incineration or co-incineration plants (if the facility is owned and operated by a municipality, these obligations ultimately fall upon the municipality). The operator shall take all necessary precautions to minimise adverse environmental and health impacts caused by the delivery and reception of waste. The minimum reception requirements include checking relevant documents and taking representative samples before unloading (the samples must be kept for at least one month after incineration). The operator must comply with operating requirements set in the Directive, particularly the minimum temperature of combustion gases and the maximum Total Organic Content (Article 6). The operator must comply with air emission limit values with and limit values for water discharges (Articles 7 and 8). The operator shall also minimise the generation of residues and recycle residues of the incineration process. The operator shall also carry out continuous and periodic measurements of pollutants (Article 11).

INFRASTRUCTURE NEEDS

The Directive requires that existing and new incineration and co-incineration infrastructure comply with set technical, technological, operational and monitoring standards. Compliance with these standards is likely to incur significant costs, including upgrading of existing facilities and/or building new facilities. Key infrastructure requirements relate to:

- the technological process safeguarding the minimum temperature of the combustion process, and the maximum Total Organic Content of slag. The operational conditions include the requirement that Total Organic Carbon (TOC) content in slag and bottom ashes is less than 3 per cent (or their loss on ignition is less than 5 per cent) of the dry weight of the material. The temperature of the combustion gas under the most unfavourable conditions must be 850°C for at least two seconds. If hazardous waste is incinerated with the content of more than 1 per cent of halogenated organic substances, the temperature must be raised to at least 1100 °C.
- the technological process safeguarding the emission limits for air pollutants and wastewater pollutants (from cleaning of the combustion gases).
- minimisation and recycling of residues from the incineration process.
- Equipment for continuous and periodic measurements of pollutants and process parameters, as well as control of waste at the reception. The following continuous measurements of air pollutants process parameters shall be carried out: NO_x, CO, total dust, TOC, HCL, HF, SO₂, temperature in the combustion chamber, oxygen concentration, pressure, and the temperature and water vapour content of the exhaust gas. Regular periodic measurements are required for heavy metals, dioxins and furans (twice a year). Certain provisions are introduced for the reduction of measurement frequency until 1 January 2005. In relation to water pollutants, continuous measurement shall be carried out for parameters specified in article 8. Spot sample measurements of suspended solids shall be undertaken daily. Periodic measurements of furans and dioxins are also required.

PLANNING AND STRATEGY PREPARATION

The Directive does not contain any additional requirements in relation to planning or strategy preparation other than those specified in the Waste Framework Directive.

REPORTING

Member States must report to the Commission on:

- derogations from the conditions laid down in the Directive;
- measures taken to comply with the Directive;
- transposition, with texts, of the main provisions of national law adopted in the field covered by the Directive.

PUBLIC PARTICIPATION REQUIREMENTS

Applications for new permits for incineration and co-incineration plants shall be made available to the public in at least one location (such as local authority offices), and for a sufficient period of time to enable public comment. The decision on the application, including a copy of the permit (and any subsequent updates), shall also be made available to the public.

To allow the public to be informed of the potential effects in the environment and to public health of incineration facilities, the public shall have access to annual reports on the functioning and monitoring of facilities incinerating more than two tonnes per hour. A list of incineration and co-incineration facilities with a nominal capacity of less than two tonnes per hour shall be made available to the public by the competent authority.

Checklist to identify non-compliance relevant to local/regional authorities

- Do incineration or co-incineration facilities under your jurisdiction come under the scope of the Directive in terms of the volume and types of incinerated waste?
- Does the performance of existing incinerators meet the operational and emission standards set by the Directive?
- Does the operation of the existing incineration facilities comply with the requirements of the Directive in relation to delivery and reception of waste and management of residues?
- Can the existing incineration facilities be economically upgraded to meet the emission standards set by the Directive?
- Do the existing operating permits meet the requirements set by the Directive?
- Do the present arrangements for measurements, monitoring and control comply with the requirements of the Directive set in Articles 10 and 11?
- Is the public informed about the operation and emissions of existing incineration facilities? Are applications for new permits for incineration and co-incineration plants available to the public?

Recommendations for local/regional authorities to address non-compliance

- Check whether the existing municipal incineration or co-incineration facilities come under the scope of this Directive (in relation to capacity and types of waste).
- Undertake an environmental audit to determine whether existing incineration and co-incineration facilities under your jurisdiction comply with operational and emission standards required by the Directive.
- Prepare an investment plan for upgrading the existing incineration or co-incineration facilities, or for building new facilities.
- Adjust the measuring, monitoring, control and reporting arrangements to comply with the requirements of the Directive.
- Make sure the public has access to information on the operation of existing incineration and co-incineration facilities, and to applications for incineration permits.

APPENDIX 4

EXERCISE ON THE SELECTION OF A WASTE MANAGEMENT SCENARIO

The objective of this exercise is to:

- discuss the pros and cons of two pre-defined waste management scenarios;
- complete the scenarios;
- evaluate the scenarios and decide which of them is more desirable for your municipality.

Time limitations do not allow a proper cost-benefit analysis. Instead, the exercise is based on pre-defined figures, inventory data and supplementary information.

SCENARIO 1

This scenario is built around a modern landfill site with a leachate collection and treatment system and a landfill gas collection and utilisation system. Apart from operating leachate and landfill gas systems, it must observe other EU Landfill Directive requirements: no liquid waste, no co-disposal with hazardous waste, landfill tariffs incorporating costs of closure and after-care for 30 years.

The landfill site will be combined with a waste minimisation and recycling system including: primary segregation at source; recycling of paper, glass, plastic, metal and bulky waste; and central composting located within the landfill site (windrow or static pile).

1. Assuming that in 5 years 50 per cent of paper, glass, plastic, metal and bulky waste is recycled, what tonnage of recycled paper, glass, plastics, metal, bulky waste and compost would you achieve? How would this reduce the volume of waste going to your landfill?
2. If this scenario was introduced in your city, what changes in your waste management system would need to be undertaken at:
 - primary collection?
 - transport?
 - recycling centre?
3. How would you cope with:
 - market for recycled waste?
 - quality of recycled waste?
 - market for compost?
 - difficulties with site selection?

SCENARIO 2

This scenario is built around a modern incinerator with energy recovery and with a flue gas cleaning facility meeting EU emission standards.

1. If this scenario was introduced in your city, what changes in your waste management system would need to be undertaken at:
 - primary collection?
 - transport?
 - transfer stations?
2. How would you cope with:
 - disposal of ashes (assuming that the mass of ash would represent 25 per cent of the initial mass of waste?)
 - difficulties with site selection?

COMPARATIVE ANALYSIS OF SCENARIOS

Compare the two scenarios taking into account:

1. Unit costs per tonne of waste for the incinerator and for the landfill site.
2. Ancillary investment and changes to the existing WM system looking at approximate capital investment cost, operational cost, maintenance cost, and revenues (from sale of recycled material, compost, etc.); which ancillary costs are likely to be higher—those for scenario 1 or those for scenario 2?
3. Is the present volume of waste sufficient for the scenario?
4. Is the volume of waste likely to be sufficient for the scenario in 10 years? (Assume an increase of waste stream equal to the increase of GDP per capita).
5. Which scenario is likely to produce a greater environmental impact? Consider the impact on air, surface water and groundwater, as well as odour and visual impact.
6. Which scenario is likely to generate more opposition among the local population? Which scenario is likely to be more problematic in terms of site selection?
7. Which scenario is likely to require a higher level of public awareness and co-operation?
8. Which scenario is likely to require significant strengthening of institutional capacity?

Taking all the above considerations into account, which scenario do you find more beneficial for your city? Please justify your statement. You are encouraged to use the results of your household and small businesses survey and your prioritised goals. You are also encouraged to select criteria with a scoring system to help you decide.

Provision of illustrative data (real data should be provided in your technical inventory report, and you are encouraged to use these data):

- Total solid municipal waste generated per year. If not available, assume 300kg/year/person.
- Average calorific value of your waste. If not available, assume 2,000 kcal/kg.
- Percentage per cent that is compostable organic waste. If not available, assume 30 per cent.
- Percentage per cent that is paper and cardboard. If not available, assume 18 per cent.
- Percentage per cent that is glass. If not available, assume 10 per cent.
- Percentage per cent that is metal. If not available, assume 5 per cent.
- Percentage per cent that is plastic. If not available, assume 6 per cent.
- Percentage per cent that is bulky waste. If not available, assume 6 per cent.
- Unit cost of landfill disposal falls with rising throughput; a cost-effectiveness study conducted by ERM revealed the optimum throughput for a landfill with gas recovery and utilisation to be in excess of 100,000 tonnes/year.
- For incineration with energy recovery, unit costs rise steeply if the throughput is less than 200,000 tonnes/year (source: ERM).
- Minimum calorific value of waste for incineration with energy recovery is 1,500 – 1,670 kcal/kg.
- The unit cost for sanitary landfill disposal in middle-income countries varies from 8 to 15 USD/tonne; the value for the UK varies from 21 USD to 45 USD/tonne (including landfill tax of about 10 USD/tonne, source: ERM).
- The unit cost for waste incineration in middle-income countries varies from 30 USD/tonne to 80 USD/tonne; the value for the UK is 45-53 USD/tonne (source: ERM)(it should be calculated net of energy sales).
- The unit cost for waste composting in middle-income countries varies from 30 to 80 USD/tonne (it should be calculated net of compost sales).

Chart for scenario selection:

Criteria:	Scenario 1 (Landfill)	Scenario 2 (incinerator)
Unit cost per tonne of waste in USD: main facility only		
Unit cost per tonne of waste in USD, ancillary facilities, specify them: ▪ ▪		
Is the volume of waste sufficient for the scenario at present?		
Is the volume of waste sufficient for the scenario in 10 years?		
Indicate the levels of environmental impacts: ▪ air ▪ surface water ▪ groundwater ▪ smell nuisance ▪ visual impact ▪ other		
Indicate the level of public support		
Indicate the need for public co-operation		
Is institutional capacity sufficient to cope with the scenario?		
Conclusions on scenario selection		

APPENDIX 5

CASE STUDY OF GRAZ

Graz is a provincial capital in Austria with a population of 240,000. Graz's waste management strategy has developed over the last 15 years in response to a waste disposal crisis faced in the mid-1980s. At that time, the waste stream was quickly rising and the only method of waste disposal was landfilling in a dumpsite that did not meet the legal requirements for waste disposal. The landfill was filling up, and there were cases of groundwater contamination by leachate.

The waste management practice has evolved in three distinct phases:

- In the early 1980s the city concentrated on finding alternative disposal facilities, as the city's landfill did not meet the environmental requirements and had to be closed.
- From 1985 to 1995, the city aimed at developing a sustainable waste management system in the longer term;
- Since 1995, the city aimed at lowering the very high costs of disposal in a landfill site owned and has operated by another city.

The unique feature of the approach to waste disposal in Graz has been the focus on minimising the volume of residual waste, and reducing the volume of landfilled waste (down to 40 per cent of generated municipal waste). The responsibilities for waste management were divided between the City Council, which is responsible for waste regulation, waste advice and waste collection, and the waste disposal company, AEVG, which manages the recycling and disposal process.

A number of lessons can be learned from Graz:

- The overriding strategy of Graz has been to reduce the amount of waste going to landfill through separate collection and sorting of waste. The sale of recycled products, reduction of the waste stream headed for landfills and the cancellation of a planned incinerator – due to the consequent lack of sufficient waste volume – have saved considerable resources.
- The city has very high levels of recycling – 85 per cent of all paper waste is collected and recycled, 80 per cent of all compostable material is collected and returned to the land, 50 per cent of produced plastic waste is recycled and 70 per cent of metal waste is collected and reused. Of the 90,000 waste bins used in the city, 56,000 bins are used for primary sorting of recyclable waste.
- Strategy drove decision making. Approaches from waste companies were not pursued until a strategy was clear. This ensured that private sector involvement complied with the city's overall goals and objectives.
- Education of the community by waste advisers employed by the City Council increases the success of waste separation.
- Tariffs are based on the amount and frequency of collection of residual waste. There is no charge for recycling waste, thus providing an incentive for waste separation. Special incentives are given to households that compost.
- Through special funding, waste reuse activities (such as conversion of cooking fat into a fuel for city buses) provide employment and training opportunities for the unemployed.

- A weakness identified by COC cities: the disposal company is publicly owned and not subject to competitive processes. The company makes a profit no higher than the level needed to meet the cost of investment and only subcontracts to private sector companies for special tasks (e.g., composting material collection).

Though there was much to learn from Graz about the value of reducing residual waste, financially and otherwise, it was recognised that change had been achieved over a fifteen-year period. This was a clear signal to other cities that implementing advanced waste management practices demands significant time.

APPENDIX 6

CASE STUDY OF PAMPLONA

The city of Pamplona is located in northern Spain. It has a population of 282,000. In 1982, 40 municipalities in the Pamplona district established a municipal association for water and solid waste management.

BASELINE SITUATION AS OF 1996

The collection system required the residents to separate recyclable materials from the rest and take these two portions to kerbside collection points. Blue bins are used for co-mingled paper, plastic, metal and glass, while green bins are for the remainder. Containers for glass are also placed at kerbside collection points.

Waste treatment is based at the Materials Recovery Facility (MRF) where co-mingled recyclable material is sorted manually. The contamination rate is still relatively high (about 60 per cent) but is gradually improving due to an on-going public awareness campaign. The glass collected separately is sent directly to reprocessors.

The collected solid waste and residue from the MRF is sent to the Pamplona landfill. The landfill has a solid rock base of low permeability that enables leachate collection. All collected leachate is treated on site. Landfill gas is collected and used to produce electricity, which provides power for the MRF. Surplus electricity is sold to the local grid, reducing the operational costs of the landfill.

As of 1996, 86 per cent of waste collected in Pamplona was landfilled, and 14 per cent was recycled. Solid waste collection and transport costs account for 67 per cent of the total municipal waste management budget. Waste processing accounts for 20 per cent, and landfilling accounts for only 13 per cent of the budget.

FUTURE SCENARIOS

Considering the possibility that the EU would ban the landfilling of organic waste, the district decided in 1992 to divert more waste from the landfill site. Five scenarios were developed to address this goal.

1. The first **baseline** scenario was the existing waste management strategy operating in Pamplona. It was used as the reference against which all new scenarios were measured. The new scenarios (2 through 5) were selected to evaluate the advantages and disadvantages of adding the following treatment options to the existing waste management infrastructure:
 - composting of organic waste;
 - composting plus an extra curb-side collection round;
 - composting of organic and paper waste;
 - composting of organic and paper waste plus an extra kerbside collection round.
2. Scenario 2 assumed the addition of a composting facility. This would divert an estimated 23 per cent of waste away from the landfill, reducing the landfilling rate to 67 per cent.

3. Scenario 3 assumed the addition of an extra kerbside collection round. This would have no effect on the shares of various waste treatment disposal methods (keeping them at the same level as in scenario 2: 10 per cent recycling, 23 per cent composting and 67 per cent landfilling).
4. Scenario 4 assumed the addition of paper to composting but without an extra kerbside collection round (as in scenario 3). This would increase the composting rate to an estimated 34 per cent, reduce the recycling rate to 4 per cent, and consequently reduce the landfilling rate to 62 per cent.
5. Scenario 5 assumed the addition of an extra kerbside collection round and of paper to composting (combination of scenarios 3 and 4). This scenario would result in the same composting, recycling and landfilling rates as scenario 4.

Scenarios 3 and 4 were most effective in diverting the waste flow from the landfill (62 per cent landfilling rate). However, scenario 2, with landfilling rate just five percentage points higher, offered better value for money (benefit to cost ratio).

Source: McDougall *et al* (2000).

APPENDIX 7

CASE STUDY OF PAZARDJIK: DEVELOPMENT OF A SOLID WASTE MANAGEMENT STRATEGY

Table of Content

Executive Summary.....	80
1. Aim and Objectives of the Case Study.....	81
2. Introduction to Pazardjik.....	82
3. Local Government in Pazardjik.....	83
4. Major Problem: Poor Waste Management System Causing Serious Threat to Public Health and Environmental Quality.....	84
5. Strategic Planning Process Applicable to Waste Management.....	84
6. Strategic Planning Process Applied in Pazardjik.....	87
6.1. Safeguarding Internal and External Conditions.....	88
6.2. Establishing the Strategy Platform	89
6.3. Identification and Addressing of Data Gaps.....	89
6.4. Baseline Conditions.....	91
6.5. Identifying Problems.....	92
6.6. Setting Priority Objectives.....	93
6.7. Developing Strategic Scenarios.....	96
6.8. Appraisal of Scenarios.....	97
7. Conclusions and Lessons Learned.....	99

EXECUTIVE SUMMARY

The local government in Pazardjik, Bulgaria inherited a poorly developed waste management system, and an illegally operated municipal dumpsite causing significant impact on the groundwater quality, human health and environmental quality. Apart from the municipal dumpsite, about 50 small illegal dumpsites were located in the municipality. They operated mostly in villages – with a total population of 41,000 – not served by waste collection.

Working within the framework of the Cities of Change network, Pazardjik developed and implemented a Solid Waste Management Strategy. The mayor established a small project team charged with coordinating the strategy development process and working alongside international and local consultants.

Data collection. The first priority was data collection. City employees and local consultants determined or prepared the following:

- the volume and composition of municipal solid waste in Pazardjik;
- environmental impact of uncontrolled municipal dumpsite;
- a feasibility study for recultivation and extension of the uncontrolled dumpsite;
- statistical data on solid waste collection in the municipality;
- comparative data for new sanitary landfills recently constructed in Bulgaria.

Apart from data collection, the project team also drafted a *status report* describing the waste management situation in Pazardjik.

Participatory stakeholder process In parallel with data collection, a participatory stakeholder process was established. Relevant stakeholders were identified and invited to join the Strategy Working Group. The Strategy Working Group was provided with the *status report* and with relevant data. The Group began by identifying problems and setting priority objectives (based on a system of selection criteria, scores and weights). The highest priority were given to neutralisation of hazardous hospital waste, establishing waste collection in villages, building a new sanitary landfill, recultivating the uncontrolled dumpsite, and establishing a collection system for hazardous waste. Establishing a system of separate collection and composting were identified as lower priorities.

Developing and appraising strategic scenarios A smaller specialist group was convened to provide technical input into the strategy development. The group developed four strategic scenarios. Scenario 1 was the “do nothing” option; scenario 2 was based on the “minimum required by law”; scenario 4 depicted the ideal, most advanced waste management system for the city; and scenario 3 fell between scenarios 2 and 4.

In order to select the most cost-effective waste management alternative for Pazardjik, an economic appraisal was applied to the four scenarios. The appraisal took into account investment and operational costs, revenues, cash flow, net present value (NPV), potential funding sources, debt repayment and financing. The appraisal showed little difference in the total cost for each scenario. The more advanced scenarios reduced the volume of landfilled waste, thus extending the life

span of the extended dumpsite and postponing high investment costs. Scenario 3 was found most cost-effective, and it was selected for Pazardjik.

Lesson learned A number of useful lessons can be learned from the Pazardjik experience:

- Successful development of a solid waste strategy requires stakeholder participation. This ensures that both the service provider and waste producers are represented.
- An experienced facilitator is very important to manage the stakeholder process.
- Strategy development requires a reliable set of data. The data are used to set priorities and prepare strategic scenarios. Pazardjik's experience in this respect is very positive.
- In performing the economic appraisal and setting priorities, stakeholders' input should be supplemented by input from experts.

1. AIM AND OBJECTIVES OF THE CASE STUDY

The aim of this case study is to demonstrate how strategic planning can help cities in Central and Eastern Europe improve their waste management system.

The target group for this case study are planners, managers, politicians and waste specialists in CEE cities. Objectives include:

- familiarising the reader with the main steps of strategic planning for waste management;
- identifying the prerequisites for a successful strategic planning process and demonstrating their importance;
- identifying various tools of strategic planning for waste management and showing how they can be applied in practice;
- demonstrating the multitude of choices and options that a city can apply to improve its waste management, and showing the implications of these choices on cost-effectiveness.

This case study simply and comprehensively presents both the process and the results of strategic planning for waste management.

2. INTRODUCTION TO PAZARDJIK

Geography

The municipality of Pazardjik is located in southern Bulgaria, in the central section of the Upper Thracian Lowland, north of Rhodopy Mountain and along the Maritsa Valley. It is predominantly flat (altitude 190-370 m). The municipality covers 63.7 km². The city of Pazardjik is situated 205 m above sea level between the two largest Bulgarian cities – the capital Sofia (120 km from Pazardjik) and Plovdiv (36 km). The Trakia international highway, part of European road E-80, connects the municipality to Western Europe and to Istanbul.

Pazardjik has a continental climate with long, very warm summers and mild winters. Good climate and soil conditions are very favourable for agricultural production (particularly of fruits vegetables). Forests occupy 8.2 per cent of the area.

Demography

The municipality's population in 2001 was 132,402. Of these, 65,153 were male and 67,249 were female. The age structure of the population is as follows: 27,665 aged up to 18; 77,870 aged 18 to 61; and 26,840 aged over 61. Surrounding the city of Pazardjik, 31 villages belong to the municipality; 91,402 live in the city and 41,000 live in the rural areas. From 1994 to 1998 the population fell by 3 per cent due to a natural decrease and migration. The average monthly income per household reached 180 USD in 2001. In December 2001, unemployment was 17.57 per cent. The structure of unemployment shows that nearly 40 per cent of all jobless were unemployed for more than six months.

About 27,000 of Pazardjik residents are of Roma origin. Only about 2 per cent of the Roma population is employed (mostly in low paid jobs). The majority of the Roma community live without access to clean water or municipal sewage. The city recently launched a project to construct a sewerage system in the Roma quarters.

Infrastructure and services

The network of roads in Pazardjik totals 400 km. The electricity and gas distribution networks are sufficiently developed. Drinking water is supplied from 88 groundwater wells, and local water networks are well developed. However, 81 per cent of water pipelines are made of asbestos (though the drinking water quality generally meets legal standards). Much worse, the municipal sewage system does not cover several villages. The city of Pazardjik has well developed social services. These include many cultural institutions, an education system and a well developed healthcare system with a regional hospital situated in Pazardjik.

3. LOCAL GOVERNMENT IN PAZARDJIK

Bulgaria has 3 levels of public administration:

- state administration at the central level;
- regional administration subordinated and reporting to the central administration;
- municipal government.

The most important administrative reforms in Bulgaria were introduced in 1995 (the Local Government and Local Administration Act) and in 1997 (the Local Budget Act and Local Taxes and Fees Act).

Local voters directly elect members of City Councils and mayors. The mayor chairs City Council meetings, and he/she is head of the city administration. The administration consists of a city hall and other units, such as budgetary units and budgetary enterprises. The mayor hires heads of units (who report to the mayor). The financial plan of each unit is included in the city budget, which is subject to approval by the City Council.

As in other Bulgarian municipalities, the local government in Pazardjik is responsible for primary education, health service, cultural services, day care, physical planning, issuing permits for construction and trade, public assets management, local public transportation, local roads maintenance, garbage collection, planning and budgeting. The municipal administration in Pazardjik delivers more than 140 different administrative services. The municipality includes 31 villages. Each village has a mayor and a small administrative office. The city hall of Pazardjik, together with village mayors, employs 197 people. Including all non-budgetary enterprises, the municipality employs nearly 400.

Planning and budgeting is done in a traditional, line-item format. Units and departments evaluate their financial needs at the end of the budgetary year. Financial needs are usually much higher than the financial means of the municipality. Consequently, the budgetary unit prepares the budget on the basis of the previous year's allocations, making small corrections according to department suggestions. The draft budget is reviewed by the deputy mayors and discussed with the mayor. After his acceptance, the draft is presented to the City Council for discussion and approval. Budgetary revenues and expenditures for 1999-2002 are presented in Table 1 (expressed in USD assuming the exchange rate of 2.2 BGL=1 USD):

Budgetary Revenues in 1,000 US dollars	1999	2000	2001	2002
	10,734	11,119	10,149	11,645
Own revenues (including taxes)	7,255	5,914	6,587	6,434
Revenues from selling property	526	758	612	70
Subsidy for financing of operation	2,641	4,842	3,183	3,900
Subsidy for capital improvement	112	73	45	-
Revenues from charges (selling services)	817	880	1,192	1,306
Budgetary Expenditure in 1,000 US dollars	1999	2000	2001	2002
	10,734	11,119	10,149	11,645
Healthcare	3,318	3,027	301	233
Education	3,369	3,195	4,525	4,646
Social services	1,063	1,057	1,486	1,839
Community services	1,407	1,098	1,231	2,480
Investment in total	225	261	616	903
Debts (2002 – deficit)	818	682	778	1,045



Table 1. Revenues and expenditure of the Pazardjik municipal budget 1999 to 2002.

4. MAJOR PROBLEM: POOR WASTE MANAGEMENT SYSTEM CAUSING SERIOUS THREAT TO PUBLIC HEALTH AND ENVIRONMENTAL QUALITY

Bulgaria, as other countries in CEE, experienced 50 years under a totalitarian system that paid little attention to environmental management. Consequently, the local government in Pazardjik inherited a poorly developed waste management system and, more importantly, an illegally operated dumpsite causing significant impact on groundwater quality, human health and environmental quality.

Waste collected in Pazardjik was deposited at the municipal dumpsite located some 7 km from the city, and covering 12 hectares. Since 1962, more than 0.5 mln tonnes of waste were deposited at the dumpsite. Operation of the dumpsite violated Bulgarian law. The site had no fencing, gate or weighbridge. There was daily levelling of waste, but soil cover was applied only three times per year. There was neither a liner, nor leachate collection system. Hazardous waste (including hospital waste) was dumped at the site. Waste scavengers represented a notorious problem. There was uncontrolled burning of methane and waste on the site. The dumpsite was located on a slope of a limestone hill not far from the river Maritsa.

Operation of the dumpsite caused serious health and environmental impacts. Groundwater in the vicinity of the site was contaminated. Run-off of surface water was migrating towards the river. There was significant littering around the dumpsite causing odour and negative visual impact.

Apart from the municipal dumpsite, about 50 small illegal dumpsites were located in the Pazardjik municipality, mostly in the villages not served by waste collection.

The waste management problems of Pazardjik became widely known. Several companies approached the city offering technological solutions while promising very low costs. But, in fact, the technologies proposed were rarely applied in Bulgaria and the cost implications were not known. Hence, their affordability for Pazardjik could not be confirmed.

Subsequently, instead of taking an opportunistic, inconsistent approach, the mayor of Pazardjik decided to act systematically and strategically. With assistance from the Cities of Change project, Pazardjik took a step-by-step approach to developing a solid waste management strategy. The strategy process and key results are presented in the subsequent sections.

5. STRATEGIC PLANNING PROCESS APPLICABLE TO WASTE MANAGEMENT

Strategic planning is a cyclical process that can be applied to solving complex problems. It is applicable to most spheres of human activities. The main components of strategic planning include: identifying problems on the basis of analysis of the existing situation; generating objectives to address the problems; appraising and prioritising objectives; generating actions supporting each objective; appraising actions; preparing a detailed action plan, including a financial plan; monitoring and evaluating progress to provide feedback for modification and im-

provement. Obviously, modifications can be introduced to this general methodology depending on specific conditions and needs of the user.

Strategic planning has been successfully applied in developing solid waste management strategies. A number of modifications are usually applied to the general strategic planning methodology to accommodate the specific context of waste management. The modifications relate to the need to forecast future waste stream in addition to preparing the *status report* in order to develop and appraise waste management scenarios. An illustration of the strategic planning cycle applied to waste management is presented in figure 1.

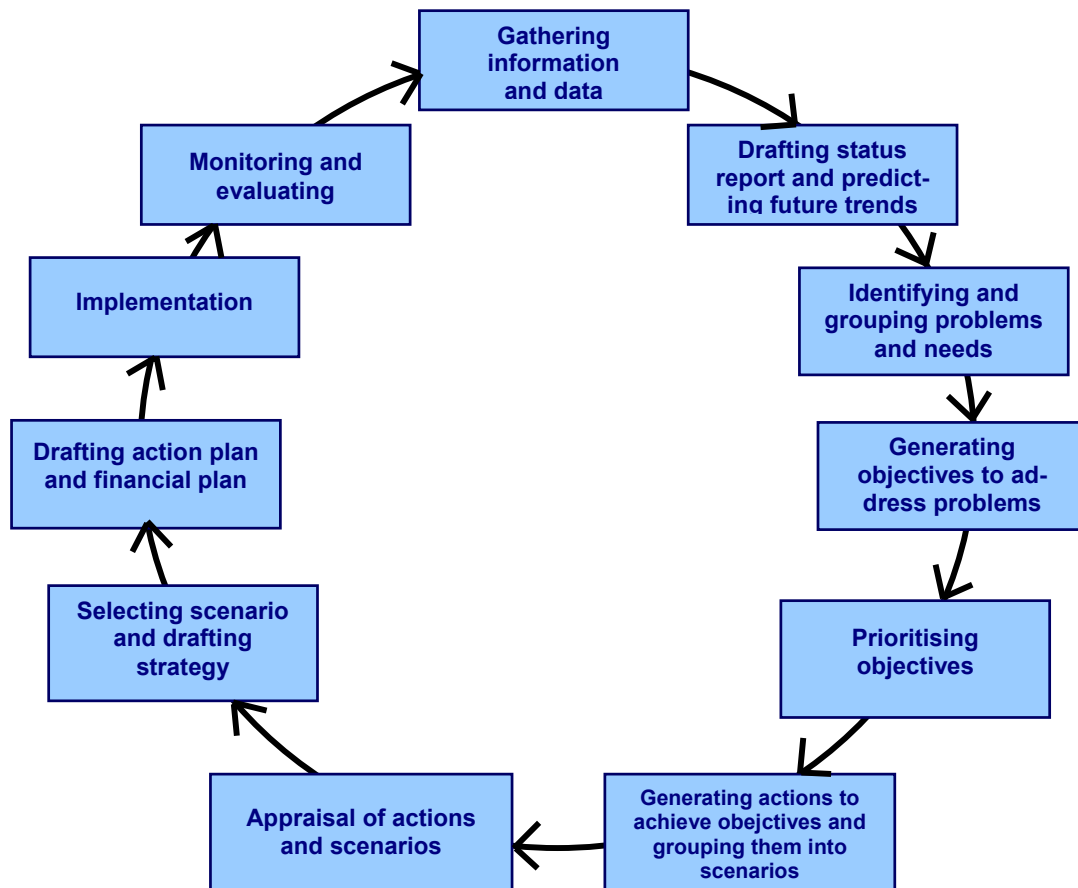


Figure 1. Illustration of the cycle of strategic planning process for waste management.

The result of the strategic planning process applied to waste management is the **waste management strategy (WMS)**. The WMS can be applied at the national, regional and municipal levels. It can deal with all types of waste or, alternatively, it can address only certain types of waste (e.g. hazardous waste, household waste, construction and demolition waste). Waste management strategies are normally developed hierarchically. First the national strategy is developed, followed by regional strategy and finally by district or municipal strategy. In this way, the instruments and priorities of the national policy are reflected in the regional WMS, and these, in turn, are reflected in the district or municipal WMS (see box 1).

Preparation of a WMS is required by the EU and by national legislation in most Central and Eastern European EU accession countries. The methodological steps of the strategic planning cycle are usually addressed by various players, including technical experts (economists, engineers, environmentalists), stakeholders and the City Council. The process must be managed by a steering group representing municipal authorities, stakeholders and all other parties involved. The next section will demonstrate how strategic planning was applied in the city of Pazardjik to address their acute environmental and infrastructural problems.

6. STRATEGIC PLANNING PROCESS APPLIED IN PAZARDJIK

The strategic planning process in Pazardjik was supported by the Cities of Change project. It was co-financed by the World Bank and the Bertelsmann Foundation. It followed closely the model approach presented in figure 1. The main result of the process was the Solid Waste Management Strategy. Much emphasis was put on integrating the stakeholder process and expert input. The experts (provided by the funding institutions) offered technical input into the process and supported the stakeholder process. Table 2 specifies responsibilities for the process management.



Methodological steps	Stakeholder involvement	City involvement	Expert involvement
checking internal and external conditions for strategy development	not involved	information provided by the city	undertaken by experts with city support
establishing the strategy platform	not involved	undertaken by the city	not involved
identifying and addressing data gaps	not involved	undertaken jointly by city and experts	
assessment of baseline conditions	not involved	undertaken jointly by city and experts	
identification of problems	undertaken by stakeholders	as part of stakeholder process	provision of facilitation and methodology
setting objectives	undertaken by stakeholders	as part of stakeholder process	provision of facilitation and methodology
setting priorities	undertaken by stakeholders	as part of stakeholder process	provision of facilitation and methodology
developing strategic scenarios	undertaken by specialist group within the stakeholder group	as part of the specialist group	provision of facilitation, methodology and technical support
appraisal of scenarios	review of report prepared by experts	provision of support to experts	undertaken by experts
preparation of implementation and financial plan	review of proposals set by experts and the city	prepared jointly by city and experts	
compiling the strategy document	not involved	undertaken by the city	provision of support to the city
approval of the Strategy	stakeholders review the strategy document, provide comments and recommend approval by the city	provided by the mayor	not involved

Table 2. Responsibilities for the methodological steps in the Pazardjik Solid Waste Management Strategy.

6.1 SAFEGUARDING INTERNAL AND EXTERNAL CONDITIONS

Prior to starting the process, consultants supporting the city conducted an assessment of internal and external conditions to determine whether the minimum conditions were met to apply the strategic planning process and participatory approach. It was generally concluded that internal and external conditions in Pazardjik were adequate to start the participatory strategic planning process. Findings of this assessment are presented in table 3.

Minimum conditions required	Assessment
political commitment and support of the City Council for development and implementation of the strategy	political commitment declared by the mayor
realistic target funding for the solid waste management strategy identified and agreed in principle	limited funding capacity of the city, but the waste tax could be raised to generate revenue for improvements in the waste sector; EU funding opportunities seen as the key funding source
part-time involvement of one person (project co-ordinator) over the duration of the strategy drafting process	secured by the city
well defined and agreed methodology and outputs	methodological support provided by the CoC project
sufficient coverage of a whole range of data	data coverage insufficient, but the city financed a data collection programme (survey on waste composition plus study on options for recultivation and extension of the existing dumpsite)
logistical support of the City Council (rooms for stakeholder meetings, faxing, photocopying facilities)	secured by the city
budget to fund external consultancy input	secured, the city financed waste composition survey and pre-feasibility study for municipal dumpsite
interest and active involvement of stakeholders	evidence that it was the case
professional facilitator	provided by the CoC project
involvement of technical experts throughout the process but particularly for the appraisal of options, economic and technological assessment	provided by the CoC project, and by the city



Table 3. Assessment of internal and external conditions in Pazardjik prior to starting the participatory strategic planning process.

6.2 ESTABLISHING THE STRATEGY PLATFORM

Prior to starting the participatory strategic planning process in Pazardjik, stakeholder analysis was undertaken. It was concluded that experts of the following institutions should be invited to join the Strategy Working Group:

- the City Council;
- the environmental inspectorate;
- waste management companies;
- environmental specialists from local industrial plants;
- village mayors;
- Sofia REC office;
- local NGOs;
- construction companies;
- waste processing and composting expert;
- representative of the institute undertaking the pre-feasibility study of the municipal dumpsite.

Overall, about 20 stakeholders and experts were invited to join the participatory stakeholder process. The list was approved by the mayor, who invited the participants to the first meeting in October 2001. Apart from the Working Group, a smaller Specialist Group was set up to provide specialist input into the strategy development process. Day-to-day management of the strategic planning process fell to the Pazardjik City Council.

6.3 IDENTIFICATION AND ADDRESSING OF DATA GAPS

Participants in the preparatory phase of the strategy process recognized that without adequate and reliable data no strategic decision could be taken to improve waste management in Pazardjik. Thus, a review of data availability was undertaken. It revealed major data gaps related to the estimation of waste quantity and waste composition, conditions of waste disposal facilities, and economic data on unit costs and costs of services (see table 3). To address these data gaps, the city contracted a waste composition survey and a technical review of the existing dumpsite. In addition, a local economist was hired by the supporting institutions to address the economic data gaps (as part of the economic assessment of waste management scenarios) (see table 4).



Type of data	Data availability	Action taken
total solid waste types and quantities generated in the city (municipal, commercial, industrial, hazardous and other)	available, based on estimation due to lack of a weighbridge. Found excessively high (640 kg/cap/year of municipal waste)	study was contracted to estimate waste quantity and composition
composition of waste: organic matter, glass, plastic, paper, ash, metal, wood, textiles, hazardous waste, etc.	rough estimation, found unreliable	study was contracted to estimate waste quantity and composition (based on four seasonal samples)
average calorific value of waste, humidity, waste density and waste fractions	data not available	waste density was re-estimated, other data found less important as incineration was not a viable option for the city
prediction of future waste stream and composition	data not available	to be estimated by the project team when data on waste quantity and composition was provided
condition of infrastructure (waste treatment, transfer and disposal facilities) and equipment (trucks, containers, etc), as well as estimated fleet availability/operability	transport equipment data reasonably available, very limited data on the conditions of municipal dumpsite	study was contracted to review dumpsite conditions and propose options for recultivation and feasibility of further extension
remaining waste capacity and estimated life span of existing waste management facilities	no data available	study was contracted to estimate the remaining life span of the dumpsite
list of entities which carry out waste management operations	available	N/A
data on waste collection systems, including time and motion data and productivity data	data not available	decision to estimate the data during strategy preparation phase
coverage of collection service among households	data available	N/A
current practice of disposal and treatment of waste: landfilling, incineration, composting, recycling	data available	N/A
current practice of illegal dumping, inventory of illegal dumpsites	data partly available	inventory prepared by the city
analysis of unit costs (i.e., costs/tonne) of solid waste collection, street sweeping, transfer and disposal	data partly available	local economist subcontracted to check/estimate the data
financial standing of the waste company and the city including borrowing capacity	data partly available	local economist subcontracted to check/estimate the data
capacity of local market for recycled materials and compost	data partly available	local economist subcontracted to review data
assessment of compliance of the city's present waste management practice with legal requirements	data partly available	assessment undertaken by the project team

Table 4. Data gaps identified in Pazardjik and actions taken to address them.

6.4 BASELINE CONDITIONS

At the starting point of the strategy drafting process, three waste companies operating on a service type contract basis handled waste management within the territory of the Pazardjik municipality. One of the three companies, Sheele Bulgaria, operated the municipal dumpsite. The service covered the city and three nearby villages (in total about 68 per cent of the total population in the municipality). The remaining 28 villages in the Pazardjik municipality (with a total population of 41,000 people) were not provided with waste collection service. In 2001 the annual municipal waste tax was set at 0.5 per cent of property value. In 2002 it was reduced to 0.45 per cent of property value. The tax covered the operational costs of waste management.

In 2000, the total volume of waste generated in Pazardjik was an estimated 76,056 m³, which included:

- 62,339 m³ of household waste;
- 554 m³ of construction and demolition waste;
- 13,163 m³ of varied industrial waste;
- 5,740 m³ of green waste from amenity areas.

The survey conducted in Pazardjik between August 2001 and April 2002 revealed the following composition of municipal waste:

▪ biomass	65.34 per cent
▪ hard plastics	4.70 per cent
▪ light plastic	4.62 per cent
▪ paper	6.51 per cent
▪ textile	1.05 per cent
▪ glass	3.56 per cent
▪ metal	0.75 per cent
▪ tyres and leather	0.25 per cent
▪ ash	11.74 per cent
▪ soil	0.90 per cent
▪ wood and timber	0.18 per cent
▪ pottery	0.11 per cent

The content of organic matter was particularly high in Pazardjik, in contrast to the content of paper and glass.

The city conducted no selective collection of recyclable materials, biowaste, bulky waste or hazardous waste (other than informal selective collection by waste pickers). In single-family housing areas (20,770 households) the mixed waste was collected in 3,200 containers of 110 litres, and 2,690 containers of 240 litres. Collection in multi-family housing areas (25,065 households) used 1,100 litre *bobber* containers, and 100 large containers (4,000 litres) located in the disadvantaged Roma quarters of the city. Small businesses used *bobber* containers (20), 240-litre containers (50), and 4,000-litre containers. Collection frequency was usually 1-2 times/week.

The transport system consisted of 6 compactor trucks, 3 container trucks, 3 dump trucks and one tractor. There were no transfer stations.

Pazardjik's waste management system violated Bulgarian environmental legislation, particularly in relation to:

- the dumpsites' operation, technical conditions impact on the environmental and human health;
- co-disposal of hazardous waste at the dumpsite, especially given the lack of fencing and the frequent incidence of waste scavenging;
- the existence of numerous small illegal dumpsites in rural areas of the municipality.

6.5 IDENTIFYING PROBLEMS

Stakeholder input into the drafting of a solid waste management strategy began in December 2001 with the first meeting of the Strategy Working Group. Before the first meeting, the invitees received a background paper on the *status quo* of waste management in Pazardjik, and a brief description of the project. At the first meeting, the methodology for preparing the waste management strategy was presented by experts and discussed. Participants in the first and second meetings identified problems related to waste management in Pazardjik through open facilitated discussion. Overall, 23 problems were identified and grouped under five headings: management, hazardous waste, ecological awareness, legislation and local government, and municipal dumpsite. The list of problems is presented below:

Management related problems
<ul style="list-style-type: none"> ▪ contamination by illegally dumped waste in large areas of the municipality; ▪ waste collection service is not provided to most villages; ▪ lack of reliable data on the weight and composition of municipal waste; ▪ insufficient control of collection and disposal of waste; ▪ lack of selective waste collection; ▪ insufficient number of waste containers in the suburbs; ▪ waste containers are often located in inappropriate places; ▪ lack of organised collection of bulky household waste; ▪ lack of collection of construction and demolition waste.
Hazardous wastes
<ul style="list-style-type: none"> ▪ poor practice of disposal of household hazardous waste in waste containers; ▪ lack of equipment/facilities for incineration of hazardous hospital waste; ▪ lack of well organised system for collection of animal carcasses; ▪ lack of facilities for incineration of animal carcasses; ▪ poor control of the collection of carcasses from slaughterhouses.
Ecological awareness
<ul style="list-style-type: none"> ▪ poor ecological awareness among citizens; ▪ misuse of waste containers; ▪ dumping of hot ash in waste containers.
Legislation and local government
<ul style="list-style-type: none"> ▪ lack of incentives for reducing waste generation; ▪ the municipal waste tax is too low to achieve a full recovery of waste collection, processing and disposal costs.
The municipal dumpsite
<ul style="list-style-type: none"> ▪ lack of sanitary landfill; ▪ negative environmental impact at the existing dumpsite; ▪ unsuitable location of current dumpsite; ▪ scavenging at the dumpsite and in waste containers.



6.6 SETTING PRIORITY OBJECTIVES

Problems identified by stakeholders were transformed into objectives that were, in turn, grouped as primary and secondary objectives. Primary objectives consisted of those upon which other objectives and actions depended. In turn, secondary objectives were dependent on the execution of primary objectives. For instance, awareness raising and education (secondary objective) should support a specific system of selective collection or treatment such as home composting (primary objective). The list of primary and secondary objectives is presented below.

Primary objectives:	
1.	Design and build a new sanitary landfill following Ordinance13 of the Bulgarian Ministry of Environment and Waters.
2.	Recultivate and reconstruct the existing dumpsite.
3.	Set up the collection of hazardous wastes from the households.
4.	Build a facility for neutralising hazardous hospital wastes.
5.	Set up the separate collection of recyclable wastes.
6.	Organise composting.
7.	Take an inventory of, and recultivate the old illegal dumpsites.
8.	Organize solid waste collection system in villages.
Secondary objectives:	
1.	Set up a special environmental control and supervision unit.
2.	Limit scavenging at the dumpsite.
3.	Establish frequent contacts with the local media to discuss problems associated with solid waste management.
4.	Organise educational activities to increase the ecological awareness of citizens.
5.	Inform citizens about specific facilities for carcass collection.
6.	Optimise the number of waste containers in the city suburbs.
7.	Prepare a system of incentives to minimise waste generation.
8.	Organise a system for collecting construction and demolition waste.
9.	Organise seasonal collection of household bulky wastes.



The next step in the strategy process was setting priorities for the primary objectives. The experts proposed a number of prioritisation criteria. The stakeholders discussed and expanded the list. Finally, nine criteria were selected. Each participant received 5 dots and attached them to criteria he/she found most important. The list of prioritisation criteria with scores attached is presented below:

Criterion 1: estimated total cost	8 points
Criterion 2: compliance with national legal requirements	5 points
Criterion 3: environmental and health benefits	11 points
Criterion 4: size of population benefiting from the objective	5 points
Criterion 5: reduction of waste stream	3 points
Criterion 6: institutional capacity required	2 points
Criterion 7: social acceptability	8 points
Criterion 8: social and economic effect	8 points
Criterion 9: effectiveness (ratio of benefits to costs)	10 points



During the course of stakeholder discussion, the group decided to ignore criterion 5 – ‘Reduction of waste stream’ (it received only 3 points), and criterion 6 – ‘Institutional capacity required’ (received only 2 points). It was further discussed that criterion 2 – ‘Compliance with the legislative requirements’ - is relevant to a very similar degree to all primary objectives, and, thus, would not affect the results

Consequently, the following criteria were selected for further application:

Criterion 1: environmental and health benefits	11 points
Criterion 2: effectiveness (ratio of benefits to costs)	10 points
Criterion 3: estimated total cost	8 points
Criterion 4: social and economic effect	8 points
Criterion 5: social acceptability	8 points
Criterion 6: size of population benefiting from the objective	5 points



Subsequently, the weighting system was set. It reflected the scores received by each criterion - all scores were divided by 5, that being the lowest score received by criterion 6. The prioritisation criteria with weights attached are presented below:

Criterion 1: environmental and health benefits (11/5 points)	weight 2.2
Criterion 2: effectiveness (ratio of benefits to costs)	weight 2.0
Criterion 3: estimated total cost	weight 1.6
Criterion 4: social and economic effect	weight 1.6
Criterion 5: social acceptability	weight 1.6
Criterion 6: size of population benefiting from the objective	weight 1.0




Next came setting the scoring system for each criterion. Based on examples provided by experts, the group developed a scoring system for each criterion:

Criterion 1: Environmental and health benefits		weight 2.2
High	score 3	
Medium	score 2	
Low or none	score 1	
Criterion 2: Effectiveness (ratio of benefits to costs)		weight 2.0
High	score 3	
Medium	score 2	
Low or none	score 1	
Criterion 3: Estimated total cost		weight 1.6
1 mln. BGL <	score 3	
1 – 5 mln. BGL	score 2	
5 mln. BGL >	score 1	
Criterion 4: Social and economic effect		weight 1.6
High	score 3	
Medium	score 2	
Low or none	score 1	
Criterion 5: Social acceptability		weight 1.6
High	score 3	
Medium	score 2	
Low or none	score 1	
Criterion 6: Size of population benefiting from the objective		weight 1.0
60-100 per cent of population	score 3	
60-40 per cent of population	score 2	
40 per cent <	score 1	



Finally, the group prioritised the primary objectives. The results are presented in table 5.



Criteria Objectives	Environmental and health benefits weight 2.2	Effective- ness (ratio of benefits to costs) weight 2.0	Estimated total cost weight 1.6	Social and eco- nomic effect weight 1.6	Social accept- ability weight 1.6	Size of popu- lation bene- fitting weight 1.6	Re- sults
1. Design and build a new sanitary landfill	3 x 2.2 6.6	2 x 2.0 4.0	1 x 1.6 1.6	2 x 1.6 3.2	2 x 1.6 3.2	3 x 1.0 3.0	21.6
2. Recultivate and reconstruct the existing dumpsite	3 x 2.2 6.6	2 x 2.0 4.0	2 x 1.6 3.2	1 x 1.6 1.6	3 x 1.6 4.8	1 x 1.0 1.0	21.2
3. Set up the collection of hazardous wastes from the households	3 x 2.2 6.6	2 x 2.0 4.0	2 x 1.6 3.2	1 x 1.6 1.6	2 x 1.6 3.2	3 x 1.0 3.0	21.6
4. Build a facility for neutralising hazardous hospital wastes	3 x 2.2 6.6	3 x 2.0 6.0	3 x 1.6 4.8	1 x 1.6 1.6	3 x 1.6 4.8	3 x 1.0 3.0	26.8
5. Set up the separate collection of recyclable wastes	2 x 2.2 4.4	2 x 2.0 4.0	2 x 1.6 3.2	2 x 1.6 3.2	1 x 1.6 1.6	3 x 1.0 3.0	19.4
6. Organize composting	3 x 2.2 6.6	2 x 2.0 4.0	1 x 1.6 1.6	2 x 1.6 3.2	2 x 1.6 3.2	2 x 1.0 2.0	20.6
7. Review and recultivate the old illegal dumpsites	3 x 2.2 6.6	3 x 2.0 6.0	3 x 1.6 4.8	1 x 1.6 1.6	3 x 1.6 4.8	2 x 1.0 2.0	25.8
8. Organize solid waste collection in villages	3 x 2.2 6.6	3 x 2.0 6.0	3 x 1.6 4.8	2 x 1.6 3.2	3 x 1.6 4.8	1 x 1.0 1.0	26.4

Table 5. Results of prioritization exercise.

The priorities were very well received by the participants. Basically, the low cost objectives of high health and environmental effectiveness were given the highest priority, which is a common sense solution. The city will pursue the top priorities establishing a new landfill site, recultivating the existing dumpsite and establishing a collection system for hazardous waste. Establishing a system of separate collection and composting (which, given the current state of WM system in Pazardjik can be considered as ‘luxury’), were assigned the lowest priorities.

6.7 DEVELOPING STRATEGIC SCENARIOS

The next step in the strategy development process was the development of strategic scenarios in order to appraise them and choose the most cost-effective option. The scenarios would cover 12 years.

Four scenarios were developed. Scenario 1 reflected the existing situation – the “do nothing” option. Scenario 2 represented the minimum changes necessary to comply with current Bulgarian legislation. Scenario 4 depicted the ideal, most advanced waste management system. Scenario 3 presented an intermediate option between Scenarios 2 and 4 (see attachment 1).

In terms of collection, the scenarios introduced home composting for the single-family housing areas. The scheme was based on distributing subsidised home composters to households. In the pilot phase, 300 composters were to be distributed. The ultimate targets for 2014 were set at 60 per cent composting rate in Scenario 2, 75 per cent in Scenario 3, and 90 per cent in scenario 4. Scenario development closely followed the set of primary and secondary objectives presented in the previous section.

All three scenarios extended collection service to all villages in the municipality, but the collection frequency would rise from once every two weeks in Scenario 2, to twice per week in Scenario 4.

No changes in collection were envisaged for multi-family housing areas, small businesses and street collection.

In terms of hazardous waste, the scenarios envisaged collection sites for batteries, chemicals and other hazardous household waste. Hospital and chemical waste would be incinerated at a regional incinerator for hazardous waste (currently under construction). Scenario 4 included additional collection points for hazardous waste in shops and service stations.

All three scenarios included collection sites for bulky waste.

The changes in the collection system would affect the transport fleet (a number of new vehicles would be needed depending on the complexity of the collection system, see attachment 1).

In relation to waste processing, apart from home composting, all three scenarios included installation of a waste compactor at the municipal dumpsite. In addition, Scenarios 2 and 3 included an open-air windrow composting site for green waste from amenity sites. Scenario 3 included installation of a vibration sieve at the dumpsite to allow a limited selection of mixed waste. Scenario 4 included installation of a sorting plant for co-mingled municipal waste, storage areas for recovered materials and a composting plant for green and organic waste.

In terms of waste disposal, all three scenarios included recultivation and extension of the present dumpsite in order to comply with Bulgarian legal requirements (fencing, weighbridge, leachate collection, gas venting, lining for new cells, etc.). Scenario 4 would significantly reduce waste volume deposited at the dumpsite due to the recovery of materials in the sorting plant, composting, and the separate collection of bulky and hazardous waste.

6.8 APPRAISAL OF SCENARIOS

To select the most cost-effective waste management alternative for Pazardjik, an economic appraisal was applied to the four scenarios. The following parameters were appraised:

- investment costs;
- operating costs;
- revenues from municipal waste tax;
- other revenues;
- cash flow;
- Net Present Value (NPV);
- Internal Rate of Return (IRR);
- potential funding sources;
- debt financing;
- debt repayment;
- operating financing.

The analysis was based on statistical data, data obtained from the city and data from the waste management companies. A number of assumptions were made. The key assumptions included:

- population decline of 0.5 per cent annually;
- increase in waste generation by 1.5 per cent annually;
- increase of real income by 5 per cent annually;
- affordability of waste management services at the level of 1.8 per cent of income;
- discount rate of 5 per cent.

Table 6 shows the total investment and operating costs of the scenarios.

Investment costs	[mln. BGL]
Scenario 1	17,999
Scenario 2	19,211
Scenario 3	16,491
Scenario 4	14,983
Operating costs	
Scenario 1	31,644
Scenario 2	28,363
Scenario 3	31,958
Scenario 4	37,800
TOTAL COSTS	
Scenario 1	49,643
Scenario 2	47,574
Scenario 3	48,449
Scenario 4	52,783



Table 6. The total investment and operating costs of strategic scenarios in Pazardjik.

The scenarios have very similar projected costs in terms of investment. That is due to the need for a new landfill. Lower direct investment costs are due to the exhausted capacity of the recultivated and expanded landfill site.

The highest costs (demonstrated below) are associated with the recultivation and expansion of the existing landfill, and with building a new sanitary landfill when the recultivated dumpsite is filled in (see table 7):

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Waste containers	598,320	598,320	598,320	598,320
Additional transport vehicles	351,000	351,000	351,000	351,000
Upgrading existing dumpsite	8,200,000	8,200,000	8,200,000	10,100,000
Individual composters	0	852,000	1,032,000	1,224,000
Weighing bridge	0	60,000	60,000	60,000
Compactor	0	300,000	300,000	300,000
Installation for biomass composting	0	0	100,000	0
Sorting plant	0	0	0	500,000
Composting plant	0	0	0	1,000,000
Building for bulky waste	0	0	0	200,000
Costs of recultivating illegal dumpsites	650,000	650,000	650,000	650,000
Costs of new landfill	8,200,000	8,200,000	5,200,000	0
	17,999,320	19,211,320	16,491,320	14,983,320



Table 7. Breakdown of investment costs in strategic scenarios.

The economic analysis demonstrates that all four scenarios have negative parameters of cash flow, net present value and internal rate of return (see table 8). Consequently, all proposed scenarios cannot be financed solely through fees from the local community. The negative financial parameters result largely from the high costs of landfill construction that complies with new technical requirements.

The scenarios which do not make sufficient efforts to reduce the volume of waste disposed at the dumpsite require the construction of a new sanitary landfill during the strategy lifetime (see table 7). Consequently, the lack of investment in composting and sorting facilities in Scenario 1 will cause space in the recultivated dumpsite to be exhausted much more quickly. This, in turn, reduces the lifetime of the existing dumpsite and brings forward the high capital investment costs of a new landfill. That is why scenarios with (initially) low capital costs and low operating costs turn out to be expensive, as they require much earlier investment in a new sanitary landfill site.

Scenario 3 turned out to be the most attractive in terms of NPV and IRR parameters and in terms of funds needed for its implementation. The minimum financial requirements for implementation of Scenario 3 would necessitate an 8 million BGL (about 3.6 mln USD) grant, and a 1 million BGL (0.45 mln USD) bank loan. Under this scheme, funds will be accumulated for continuing the construction of a new landfill, as only a minimum bank loan is needed. Thus, Scenario 3 will guarantee self-financing, which is one of the major criteria for project sustainability.

In implementing scenario 3 with the specified sources of financing, the municipality would have to safeguard in the annual budgets the necessary funds for operating financing, as well as an annual net leftover for managing credit repayment.

Selected key parameters	Values [BGL] or [%]
Total revenues nominal	
Scenario 1	32,471
Scenario 2	31,303
Scenario 3	34,306
Scenario 4	37,482
Net Present Value (NPV)	
Scenario 1	-16,883
Scenario 2	-15,756
Scenario 3	-13,845
Scenario 4	-15,938
Internal Rate of Return (IRR)	
Scenario 1	-37 %
Scenario 2	-36 %
Scenario 3	-31 %
Scenario 4	-32 %



Table 8. Key economic parameters for strategic scenarios in Pazardjik.

7. CONCLUSIONS AND LESSONS LEARNED

Many cities in CEE experience waste management problems similar to those of the municipality of Pazardjik – uncontrolled dumpsite, a poor solid waste management system, low-income level and low financing ability of the local population, and limited institutional capacity within the city to address the problems. In addition, the private sector is aggressively targeting CEE cities with waste management technologies, often without adequate analysis of the economic impacts for the city. The case of Pazardjik demonstrates how a consistent, strategic approach to solving waste management problems can be applied in cities with limited institutional capacity and funding sources. Such an approach allows the city to identify the most cost-effective waste management option.

A number of factors contributed to the success of Pazardjik, including:

1. The mayor showed leadership and a good understanding of the strategic approach to solving solid waste management problems:
 - The mayor used the opportunity to participate in the Cities of Change network to build capacity for solid waste management in the city hall.
 - The mayor established a dynamic and very committed project team, which was keen to learn and apply the knowledge gained.
2. The city made significant efforts to undertake surveys, collect data and perform analysis in order to make intelligent decisions based on understanding problems, their causes, objectives and priorities.

3. The city used the Cities of Change project to build capacity and exchange experiences:
 - Representatives of other cities facing similar problems shared their experience with Pazardjik.
 - CoC provided training on participatory methodology for strategic planning in waste management, best practice presentations and study tours.
 - CoC provided consulting support for the strategy development (both process management and technical input).
 - CoC provided local consulting support in economic appraisal and waste technology.

A number of lessons can be learned from the experience of Pazardjik:

1. The participatory strategic planning approach to solving solid waste management problems can be successfully applied in CEE cities. The success requires:
 - clear leadership and support from the mayor and City Council;
 - a committed project team capable and willing to learn;
 - training and a platform for the exchange of information with other cities;
 - external expertise and consulting support.
2. The systematic effort to analyse waste stream volume and composition, assessment of the environmental impact of existing dumpsite and feasibility study of recultivation and extension of the municipal dumpsite paid off in terms of providing a solid basis for strategic decision making.
3. Stakeholder involvement in the strategy development process is not common in CEE cities. The experience of Pazardjik shows that it can be applied successfully, brings credibility and gives stakeholders a sense of ownership of the strategy.
4. The results of the strategy demonstrate that the lowest cost solutions are not always most effective. The investment into waste processing facilities pays off by saving space in the landfill site. It is also important to look at other external costs and benefits.
5. Priority objectives should be used to develop alternative scenarios. However, only a rigorously applied economic assessment of alternative scenarios can provide the answers as to what are the most cost-effective and affordable options for cities with a relatively low income base.

Attachment 1: Waste management scenarios set for Pazardjik

SCENARIO 1 (do nothing)		SCENARIO 2		SCENARIO 3		SCENARIO 4	
Collection from single-family houses							
3200 bins for mixed waste (110 l) collection frequency 1-2/week	In addition to scenario 1 setting up home composting. Initially 300 subsidized home composters; a target of 60 per cent of homes by 2014 (12 years); extending waste collection to remaining 28 villages (41,000 population) with collection frequency once/2 weeks	In addition to scenario 1 setting up home composting. Initially 300 subsidized home composters; a target of 75 per cent of homes by 2014 (12 years); extending waste collection to remaining 28 villages (41,000 population) with collection frequency once/week		In addition to scenario 1 setting up home composting. Initially 300 subsidized home composters; a target of 90 per cent of homes by 2014 (12 years); extending waste collection to remaining 28 villages (41,000 population) with collection frequency twice/week			
2690 bins for mixed waste (240 l) collection frequency 1/week							
Collection from blocks of flats¹							
743 Bobber containers (1,100 l) Daily collection 100 K4 containers (4,000 l) Collection frequency: 1-2/week	as in scenario 1	as in scenario 1		as in scenario 1		as in scenario 1	
Collection from small businesses¹							
20 Bobber containers (1,100 l) Daily collection 50 containers (240 l) Collection frequency 1-2/week 14 K4 containers (4,000 l) Collection frequency 1/week	as in scenario 1	as in scenario 1		as in scenario 1		as in scenario 1	
Collection from city center¹							
110 street bins (15 l) collection frequency 1-2/day	as in scenario 1	as in scenario 1		as in scenario 1		as in scenario 1	
Collection of hazardous waste							
Not organized at present	Set up several bring sites for collection of hazardous waste (batteries, chemicals and bulbs); hospital and chemical waste incinerated in a new incinerator for hazardous waste located 120km from Pazardjik (currently under construction)	as in scenario 2		as in scenario 2		as in scenario 2 In addition, containers for collection of certain types of hazardous waste (batteries, medicines, car batteries, tyres, chemicals) installed in shops and service stations; Storage areas for collected hazardous waste	
Collection of bulky waste							
Not organized at present	not envisaged	Bulky waste bring site to be set up		as in scenario 3			

Transport			
2 trucks rorto-pressure 18m ³ 2 trucks vario-pressure 18 m ³ 2 trucks vario-pressure 12 m ³ 3 container trucks of 4 m ³ 3 dump trucks 1 large tractor	additional vehicles would be required to extend the waste collection to villages; for the West region 2 pressure trucks of 18-20m ³ ; for the East region 1 truck , 1 truck for K4 containers, 1 large tractor; for the Central region, 1 truck 18-20m ³ , 3 trucks for K4 containers	additional vehicles would be required to extend the waste collection to villages; additional large tractor is envisaged for the dumpsite	additional vehicles would be required to extend the waste collection to villages; additional large tractor is envisaged for the dumpsite
Processing			
Not organized at present	Waste compactor installed on site; family composting; open air windrow composting site for green waste from amenity sites	Waste compactor installed on site; family composting; vibration sieve on the dumpsite for easy separation of certain waste fractions; open air windrow composting site for green waste from amenity sites; storage areas for materials recovered at the vibration sieve	Waste compactor installed on site; family composting; construction of sorting plant for commingled municipal waste storage areas for materials recovered at the sorting plant; composting plant (technology and costs to be estimated)
Waste disposal			
All collected waste is dumped at the dumpsite (excluding materials collected by scavengers) Total waste volume in 2000: 76,056 m ³ Of which: Household waste: 62,339 m ³ Construction waste: 554 m ³ Industrial waste: 13,163 m ³ Green waste: 5,740 m ³	The green waste from amenity sites and organic waste from home composting project are diverted from the waste stream going to dumpsite; weighbridge is to be installed at the entrance to the dumpsite; recultivation and reconstruction of the existing dumpsite (in line with the pre-feasibility study) extending the lifetime by 10-12 years – estimated cost 10 mln BGL; recultivation of old illegal dumpsites in the municipality – estimated cost 50,000 leva	The green waste from amenity sites, organic waste from the home composting project, bulky waste and materials recovered at the vibration sieve are diverted from the waste stream going to the dumpsite; weighbridge is to be installed at the entrance to the dumpsite; recultivation and reconstruction of dumpsite as in scenario 2; recultivation of illegal dumpsites as in scenario 2	Large part of the waste stream is diverted away from the dumpsite at the sorting plant; green waste and organic waste from home composting is diverted from the waste stream; weighbridge is to be installed at the entrance to the dumpsite; recultivation and reconstruction of dumpsite as in scenario 2; recultivation of illegal dumpsites as in scenario 2