

Bertelsmann Foundation (ed.)

# Strategic Management in Municipal Environmental Policy

Cities of Change Knowledge Product Series  
Vol. 2

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THE WORLD BANK



Bertelsmann Stiftung

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*Dr. Dariusz Kobus*

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*Dr. Dariusz Kobus*

Practical Guidebook on Strategic Planning in Municipal Waste Management

*Dr. Dariusz Kobus*

Practical Guidebook on Strategic Planning for Municipal Environmental Management

*Contact Information*

The **CD-ROM** attached to this folder contains the Bulgarian, Hungarian, Latvian, Polish, and Slovak **translations** of the *Practical Guidebook on Strategic Planning in Municipal Waste Management*, without Appendices 7 and 8.

## ***Preface***

Solid waste management is a common challenge to many cities across the world. On the one hand municipal waste management is capital-intensive, on the other hand there are numerous alternative options that can be applied to address waste management problems. These issues were particularly acute in five cities of Central and Eastern Europe invited to join the Cities of Change project in 1999. The cities faced difficulties with building or upgrading their waste disposal facilities and with achieving compliance with the complex and expensive EU environmental requirements. Consequently, the work in the environmental cluster started with applying strategic planning to address the acute solid waste management problems. Emphasis was put on a participatory approach, the involvement of stakeholders, their interaction with experts, and a scenario analysis to choose the most cost-effective alternative options. The promotion of good practices, methodological advice, workshops, study tours and specialist consultancy input was provided to enable the strategy development. Strong city teams were established to lead the preparation and implementation of the Solid Waste Management Strategies. The strategy work substantially increased environmental capacities within city administrations of the participating towns.

When the Waste Management Strategies were completed and their implementation started, the focus moved towards developing more comprehensive Municipal Environmental Strategies. The problem sector which required particular attention was municipal water management (sewerage system, wastewater treatment and provision of good quality drinking water). In addition, environmental stress caused by increasing traffic and unsatisfactory conditions of public green areas and amenity sites created planning and financial challenges for the participating cities. The development of the Municipal Environmental Strategies followed the path of the strategic planning for municipal waste management. The experience gained in the first phase of the project allowed the participating cities to proceed more smoothly and expediently through the strategic planning process applied to environmental management. The main difference between the two processes was the approach to setting up and analyzing alternative scenarios, which is highly recommended for waste planning but in reality too complex to apply to broader environmental strategies.

The work and the knowledge products resulting from it have been undertaken through a full partnership between the Bertelsmann Foundation and the World Bank. The Environmental and Waste Management Knowledge Products presented in this folder comprise the following key components:

- **Practical Guidebook on Strategic Planning in Municipal Waste Management** providing step-by-step methodological guidance through the participatory municipal waste management planning. The approach presented is illustrated with numerous examples, boxes and activities. In addition, the guidebook includes several case studies from cities participating in the project: Ostrów -Wielkopolski (Poland), Pazardjik (Bulgaria) and Győr (Hungary) as well as shorter case studies disseminating good international practice in municipal waste management in Austria (Graz) and Spain (Pamplona). The guidebook includes also a summary of the main requirements of the EU waste management legislation.
- **Practical Guidebook on Strategic Planning for Municipal Environmental Management** dealing with the development and implementation of broader municipal environmental strategies. The guidebook leads the reader through the methodological steps that need to be taken to start, develop and implement the municipal environmental strategy. It includes the description of alternative tools and methods and clearly specifies responsibilities for carrying out specific tasks. Emphasis is put on the analysis and ranking of environmental problems, the generation of priority objectives, the selection and packaging of measures and finding synergies amongst measures that can be applied to achieve the strategic objectives. The guidebook includes numerous boxes, figures, examples and case studies describing the concepts presented, demonstrating their pros, cons and practical application.

These materials can also be found at the Cities of Change website [www.citiesofchange.net](http://www.citiesofchange.net), which also includes the key resources and information about the pilot cities and environmental management.

The materials and information in this folder have been written with the intention to disseminate the good practice from this program. The value of the project was that methodological guidelines were drafted, revised and adjusted hand-in-hand with their practical implementation in the pilot cities. The key lessons learned in the CoC Environment/Waste Management Strategic Planning Process include:

- Strategic planning for municipal environmental management and waste management is a continuous cyclic process. It requires regular adjustments and revisions. Each strategic cycle brings the city closer to meeting high environmental standards.
- A strategy document is important but equally important are the process leading to its development and implementation arrangements. Successful implementation of environmental and waste management strategies is strongly linked to the quality of the strategic planning process and the degree of institutionalization.

- Much effort is needed in the early preparatory stage of the strategy-making to make sure that minimum conditions for strategy development and implementation are met. Weaknesses and gaps of the preparatory stage have a knock-on effect during the development and implementation of the strategy and can derail the process or compromise its quality. Cities are discouraged from embarking on the full-scale strategic planning process for environmental management and waste management before the minimum conditions for a successful process are met.
- The main difference in the methodological approach between Municipal Environmental Strategy and Municipal Waste Management Strategy is the selection of tools to identify problems, and the approach to scenario analysis which is too complex to apply to broad environmental strategies.
- Priority-setting and scenario analysis are very important tools to select the most cost-effective solutions addressing environmental and waste management problems.
- A participatory environmental planning process minimizes public opposition and attracts support for funding from international agencies.
- Technical and economic expert input should go hand-in-hand with participatory stakeholder process.
- An implementable Environmental and/or Waste Management Strategy should have a sound financial plan. Strategies without a financial plan become wish lists of actions that are rarely implemented and largely ignored.
- The implementation of environmental infrastructure projects required to achieve compliance with the EU environmental legislation is capital intensive and requires co-financing by the EU accession and pre-accession funding sources, particularly in the water sector.

***Dariusz Kobus***

***Environmental consultant to the World Bank, Washington DC***

Dariusz Kobus (ed.)  
**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.

The statements, findings, conclusions and recommendations expressed in this paper are those of the consultant and do not necessarily reflect the views of the World Bank or the Bertelsmann Foundation. The conclusions do not represent official policy of either the World Bank or the Bertelsmann Foundation.



## 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](http://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.



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## 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 NIMBY<sup>1</sup> 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 stakeholders<sup>2</sup>, 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) project<sup>3</sup>. 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.

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<sup>1</sup> 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.

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

<sup>3</sup> 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.

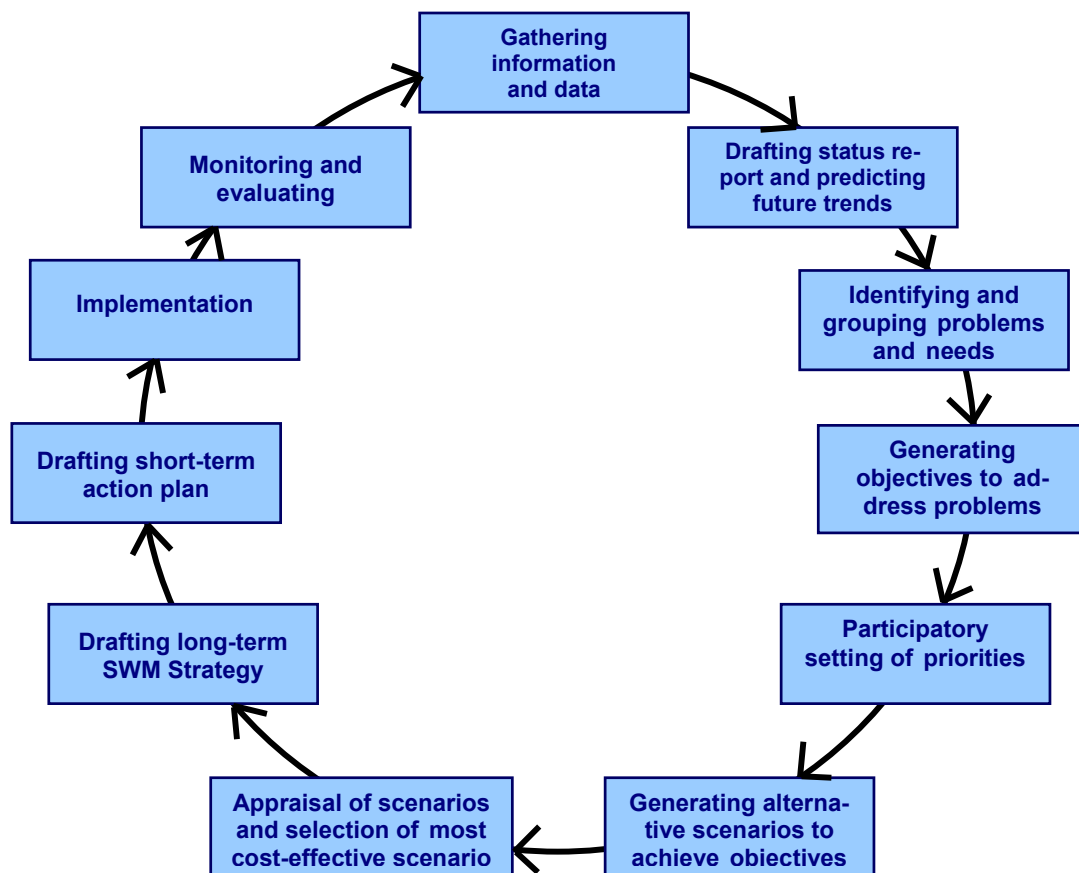
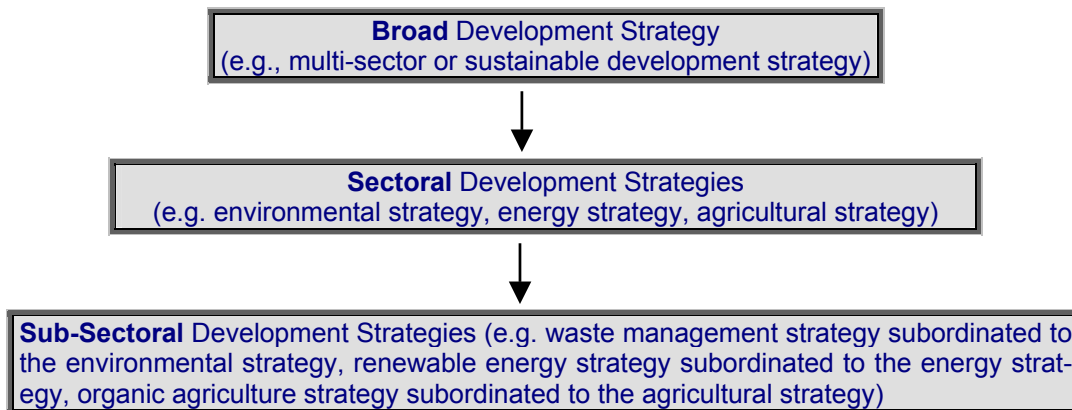


Figure 1. View of Strategic Planning Cycle for Solid Waste Management

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’ directives<sup>4</sup> 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.

<sup>4</sup> 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.<sup>5</sup>**



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 billion<sup>6</sup>. 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.

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

<sup>6</sup> 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

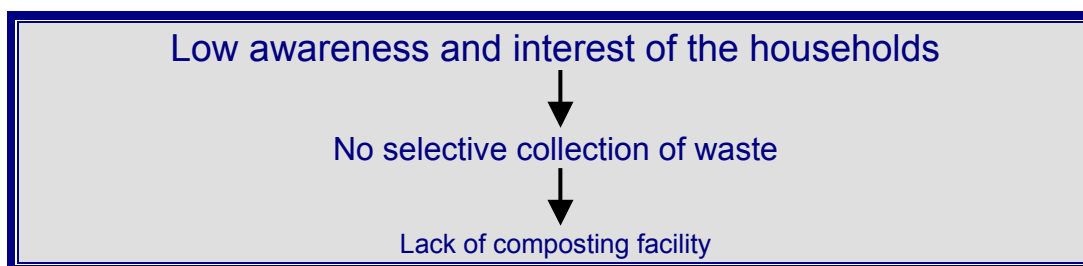
This chapter will guide you step by step through the main phase of the strategic planning process for municipal solid waste management (see the methodological steps presented in Figure 1) Responsibility for the strategic phase lies with the project co-ordinator, external experts and the stakeholders. 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

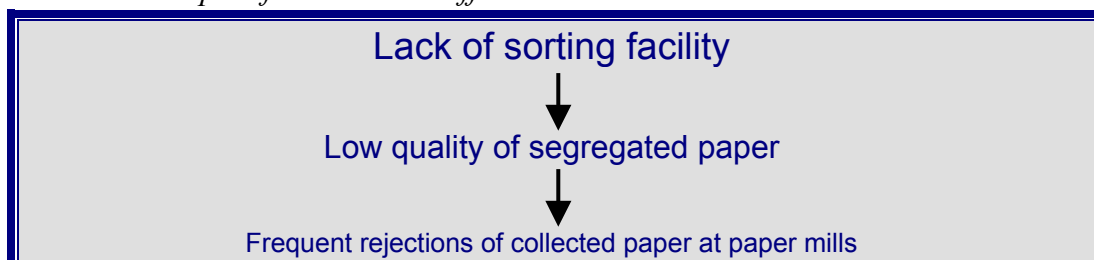
**This step can be led by a group of stakeholders with assistance provided by facilitator, and in co-operation with experts who may offer their expert opinion and comment on the results. It should be undertaken at the second stakeholder meeting.**



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:*

<b>Criterion: Estimated total cost in Euros:</b>	
> 1 million	score 1
0.5 million - 1 million	score 2
0.2 million - 0.5 million	score 3
< 0.2 million	score 4
<b>Criterion: Environmental benefits<sup>7</sup>:</b>	
None	score 1
Low or indirect	score 2
Medium	score 3
High	score 4
<b>Criterion: Size of beneficiary or affected population:</b>	
0 – 25%	score 1
25 – 50%	score 2
50 – 75%	score 3
75 – 100%	score 4
<b>Criterion: Leads to waste stream reduction</b>	
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
<b>Criterion: Social acceptability</b>	
None	score 1
Low	score 2
Medium	score 3
High	score 4

<sup>7</sup> 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	<b>26.8</b>
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	<b>26.4</b>
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	<b>25.8</b>
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	<b>21.6</b>
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	<b>21.6</b>
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	<b>21.2</b>
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	<b>20.6</b>
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	<b>19.4</b>

*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.

	<b>Scenario 1 - Landfilling</b>	<b>Scenario 2 - Incineration</b>
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
<b>decision</b>	<b>go ahead</b>	<b>abandon</b>

*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

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## **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)<sup>9</sup>
- ☐ 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.

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<sup>9</sup> 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<sub>x</sub> and NO<sub>x</sub> 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<sub>x</sub>, CO, total dust, TOC, HCL, HF, SO<sub>2</sub>, 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**

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## 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 km<sup>2</sup>. 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):

<b>Budgetary Revenues in 1,000 US dollars</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>
	<b>10,734</b>	<b>11,119</b>	<b>10,149</b>	<b>11,645</b>
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
<b>Budgetary Expenditure in 1,000 US dollars</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>
	<b>10,734</b>	<b>11,119</b>	<b>10,149</b>	<b>11,645</b>
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.

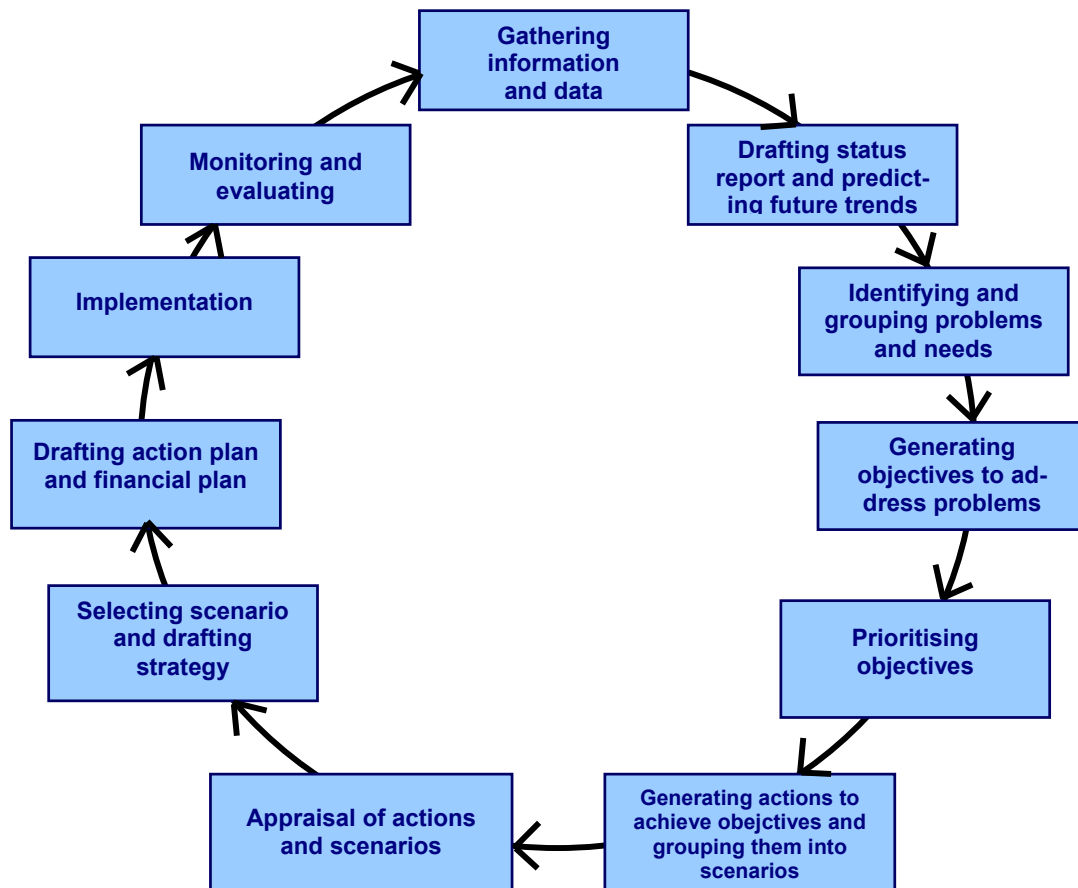


Figure 1. Illustration of the cycle of strategic planning process for waste management.

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 m<sup>3</sup>, which included:

- 62,339 m<sup>3</sup> of household waste;
- 554 m<sup>3</sup> of construction and demolition waste;
- 13,163 m<sup>3</sup> of varied industrial waste;
- 5,740 m<sup>3</sup> 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:

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



## 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.

<b>Primary objectives:</b>	
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.
<b>Secondary objectives:</b>	
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:

<b>Criterion 1: Environmental and health benefits</b>		<b>weight 2.2</b>
High	score 3	
Medium	score 2	
Low or none	score 1	
<b>Criterion 2: Effectiveness (ratio of benefits to costs)</b>		<b>weight 2.0</b>
High	score 3	
Medium	score 2	
Low or none	score 1	
<b>Criterion 3: Estimated total cost</b>		<b>weight 1.6</b>
1 mln. BGL <	score 3	
1 – 5 mln. BGL	score 2	
5 mln. BGL >	score 1	
<b>Criterion 4: Social and economic effect</b>		<b>weight 1.6</b>
High	score 3	
Medium	score 2	
Low or none	score 1	
<b>Criterion 5: Social acceptability</b>		<b>weight 1.6</b>
High	score 3	
Medium	score 2	
Low or none	score 1	
<b>Criterion 6: Size of population benefiting from the objective</b>		<b>weight 1.0</b>
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	<b>21.6</b>
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	<b>21.2</b>
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	<b>21.6</b>
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	<b>26.8</b>
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	<b>19.4</b>
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	<b>20.6</b>
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	<b>25.8</b>
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	<b>26.4</b>

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.

<b>Investment costs</b>	<b>[mln. BGL]</b>
Scenario 1	17,999
Scenario 2	19,211
Scenario 3	16,491
Scenario 4	14,983
<b>Operating costs</b>	
Scenario 1	31,644
Scenario 2	28,363
Scenario 3	31,958
Scenario 4	37,800
<b>TOTAL COSTS</b>	
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
	<b>17,999,320</b>	<b>19,211,320</b>	<b>16,491,320</b>	<b>14,983,320</b>



*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 [%]
<b>Total revenues nominal</b>	
Scenario 1	32,471
Scenario 2	31,303
Scenario 3	34,306
Scenario 4	37,482
<b>Net Present Value (NPV)</b>	
Scenario 1	-16,883
Scenario 2	-15,756
Scenario 3	-13,845
Scenario 4	-15,938
<b>Internal Rate of Return (IRR)</b>	
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	
<b>Collection from single-family houses</b>							
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							
<b>Collection from blocks of flats<sup>1</sup></b>							
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	
<b>Collection from small businesses<sup>1</sup></b>							
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	
<b>Collection from city center<sup>1</sup></b>							
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	
<b>Collection of hazardous waste</b>							
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	
<b>Collection of bulky waste</b>							
Not organized at present	not envisaged	Bulky waste bring site to be set up		as in scenario 3			

<b>Transport</b>			
2 trucks rorto-pressure 18m <sup>3</sup> 2 trucks vario-pressure 18 m <sup>3</sup> 2 trucks vario-pressure 12 m <sup>3</sup> 3 container trucks of 4 m <sup>3</sup> 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 <sup>3</sup> ; for the East region 1 truck , 1 truck for K4 containers, 1 large tractor; for the Central region, 1 truck 18-20m <sup>3</sup> , 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
<b>Processing</b>			
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 co-mingled municipal waste storage areas for materials recovered at the sorting plant; composting plant (technology and costs to be estimated)
<b>Waste disposal</b>			
All collected waste is dumped at the dumpsite (excluding materials collected by scavengers) Total waste volume in 2000: 76,056 m <sup>3</sup> Of which: Household waste: 62,339 m <sup>3</sup> Construction waste: 554 m <sup>3</sup> Industrial waste: 13,163 m <sup>3</sup> Green waste: 5,740 m <sup>3</sup>	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



Dariusz Kobus (ed.)

# **Practical Guidebook on Strategic Planning for Municipal Environmental Management**

A Knowledge Product of



THE WORLD BANK



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*Responsible: Gabriele Schöler, Claudia Walther*  
*Cover Design: Boris Kessler*  
*Layout and typesetting: Vanessa Meise*  
[www.citiesofchange.net](http://www.citiesofchange.net)

## **Disclaimer**

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## Executive Summary

Effective environmental management is a complex and challenging task for city governments<sup>1</sup> in Central and Eastern Europe (CEE). The cities inherited from the socialist period poor quality environmental infrastructure and services such as technologically outdated water and wastewater treatment plants, water distribution networks with high leakage rates, a sewerage system that often does not cover the whole city area, inefficient coal fired boiler houses in heating plants, high energy losses in the distribution network and in houses, waste disposal sites that do not meet the requirements of modern sanitary landfills, soil and groundwater contaminated by industrial plants, traffic congestion due to lack of by-pass roads etc. In the recent years, new environmental challenges are emerging: the traffic is rapidly increasing due to quickly rising ownership of private cars causing air and noise pollution, the waste generation is growing due to changing consumption patterns and increased packaging.

Adding to those problems, the cities in the CEE countries set to join the European Union in 2004, as well as cities of the Balkan EU accession countries, Turkey, and other countries aspiring for EU membership in the future (such as Ukraine or Serbia), are tasked by the central governments to meet the ambitious EU environmental requirements. Thus, the specific context of the CEE cities is that their strategic choices in terms of environmental management are significantly limited by the overwhelming requirement of adoption and implementation of the ambitious EU environmental requirements. These requirements are very costly, particularly in relation to wastewater treatment, sewerage system, drinking water quality, waste disposal, waste recycling and recovery. They also require rigorous environmental planning and management. Yet, funds to cope with environmental requirements are limited and the EU funding sources involve complex project preparation procedures.

Consequently, the CEE cities need guidance and assistance in developing a sound approach to municipal environmental management. The most effective way to address environmental management challenges and make appropriate sustainable choices is to apply strategic planning to develop and implement a city-specific Municipal Environmental Strategy. This guidebook provides practical advice on how an environmental strategy can be developed and implemented at the city level. It introduces the concept of strategic planning for environmental 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.

<sup>1</sup> The terms *city government*, *municipal government* and *local authority* are used interchangeably in this guidebook.

Each chapter contains straightforward exercises, methodological recommendations and good practice notes to illustrate the concepts presented and to demonstrate how they can be addressed in a participatory process involving stakeholders. The purpose of the guidebook is presented in the first chapter. Chapter 2 describes the strategic planning cycle applied to municipal environmental management. Chapter 3 highlights the conditions necessary to start the strategic planning process, discusses the balance between stakeholder and participatory approach to the MES preparation and provides an overview of the key EU environmental requirements for benchmarking purposes. The next chapter describes the preparatory stage of the MES looking at how to set up the stakeholder MES process and how to allocate responsibilities; describes the approaches to data collection; and guides the reader through the drafting of the Environmental Status Report and the SWOT analysis. The subsequent chapters describe in detail the strategic phase of making the MES. First, the approach to identification, analysis and ranking of environmental problems is presented in chapter 5. Subsequently, the generation of community vision and specific objectives are described in chapter 6. Chapter 7 describes the selection, packaging and appraisal of measures addressing specific objectives. It also includes a detailed description of a range of soft and hard investment types of measures and provides examples of packages of measures. Chapter 8 describes how a financial plan can be prepared and how the strategy document and action plan can be put together. Chapter 9 presents the implementation phase of the MES. It describes the institutionalisation of the MES, it presents Logical Framework Analysis as a project preparation tool, it describes how the MES progress can be monitored, and it guides the reader through the updating and revision of the strategy. Appendices provide the reader with useful case studies and with further methodological guidance. Appendix 1 describes the MES case study of the Polish city of Chelm. Appendix 2 provides a more detailed description of the EU environmental legislation. Appendix 3 presents a sample questionnaire survey exploring the level of satisfaction with environmental quality and environmental services in the city. Appendices 4 and 5 provide overviews of the Cost-Effectiveness Analysis and Cost-Benefit Analysis.

The guidebook leads the readers through the whole cycle of strategic planning in municipal environmental management consisting of the following main methodological steps:

- collection of data and identification of environmental problems based on analyses of the existing situation and predicted future trends (including pollution sources, state of environmental infrastructure, environmental quality etc). The findings of an initial environmental review should be presented in the Environmental Status Report;
- selection of priority environmental problems applying problem tree analysis or comparative risk assessment methods;
- generation of objectives addressing environmental problems focusing on quantitative targets the list of objectives should be harmonised with existing municipal strategies and plans relevant to environmental management;

- prioritisation of objectives and targets applying multicriteria methods with emphasis on cost-effectiveness;
- identification of measures to meet environmental objectives (including soft and investment-type measures both preventive and end-of-pipe);
- preparation and appraisal of alternative packages of measures looking at their cost-effectiveness, environmental benefits, social impacts and affordability for the local population;
- adjusting and re-examining environmental objectives to ensure that they are affordable and realistically implementable;
- preparing the financial package for the MES including clearly identified sources of funding and funding mechanisms;
- preparing concrete action and implementation plans for the selected environmental objectives and packages of measures;
- institutionalisation of the MES;
- monitoring and evaluating the implementation progress leading to reformulation and updating of the strategy when sufficient implementation insight is gained.

Special emphasis in this guidebook is put on identification, analysis and ranking of environmental problems, generating priority objectives, selecting and packaging measures addressing objectives, as well as synergies among various proposed tools. The guidebook also suggests how best to assign responsibilities for various elements of the strategic planning process among local government officials, external environmental experts, interested stakeholders and representatives of the community. It indicates potential stakeholder groups to be involved in developing the environmental strategy and outlines their potential contribution. Although potential problems related to participatory planning are discussed, the guidebook strongly recommends involving the community in the planning process.



## Glossary of terms

**Approximation:** term used in the EU accession context to describe the obligation of a country to fully align (through transposition) its national laws, regulations, rules and procedures with the entire body of the European Community Law.

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

**Cluster Systems:** a hybrid system for wastewater collection and treatment suitable for up to 100 individual houses whereby low cost and no-maintenance sewers collect wastewater and transfer it to an easily operated treatment facility (e.g. sedimentation tank and a reed-beds lagoon).

**Comparative Risk Assessment:** analytical methodology for comparing the significance of environmental problems in a systematic way, based upon relative risks that these problems pose to public health, natural environment and the quality of life.

**Cost Benefit Analysis:** a method of consistent evaluation and comparison of both positive and negative financial and economic impacts of a given project. It attempts to predict the economic and financial consequences of an action and give a recommendation whether the action is viable or not. The CBA differs in terms of defining the scope of 'costs' and 'benefits' and the methods of their evaluation. For instance, the environmental and social costs and benefits may or may not be included in the analysis – with significant implications on the final result.

**Cost-effectiveness:** the ratio between the physical results and costs incurred to get these results. Cost-effectiveness analysis may be used to compare different options of getting a given result - sometimes cost-effectiveness analysis may be even used instead of CBA, if the decision on implementation of a given project has been taken based on other than economic criteria (i.e. irrespective of the fact that the financial parameters are negative, which may be due to high but impossible to value benefits).

**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.

**Discounting:** the process of expressing future values in present terms, using the *discount rate*. It allows to compare the values of costs and benefits accruing to different periods of time.

**Discount rate:** the rate at future values are discounted to the present. Its value is usually adopted at the level equal to the opportunity cost of capital. The impact of this parameter on the results of the analysis is usually tested within the framework of *sensitivity analysis*.

**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 EU member states are required to adopt in their national legislation.

**Environmental *acquis*:** the entire body of the European Union environmental legislation comprising of directives, regulations and decisions.

**Externality:** positive (external benefit) or negative (external cost) impact of the project on third parties without compensation. Environmental pollution is a classic example of externality. Cost-benefit analysis is to account for externalities (though some of them may be extremely difficult to quantify and monetise), while financial analysis usually disregards them.

**Internal Rate of Return (IRR):** the discount rate at which the NPV value of the project would equal zero. IRR can also be referred to as FRR (Financial Rate of Return) or ERR (Economic Rate of Return), for stressing that the analysis is focusing only on financial or on full socio-economic aspects, respectively. Interpretation: this indicator should be compared with the rate of return on capital, i.e. if there are other options for investment with higher rates, these should proceed.

**Net Present Value (NPV):** difference between the present values of future project cash inflows (benefits) and outflows (costs). Sometimes referred to as ENPV (Economic Net Present Value), for stressing the fact that socio-economic values have been taken into account. Interpretation: generally, the projects with positive NPV are worthwhile to implement (the benefits exceed the costs).

**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.

**Objective tree:** strategic planning tool applied to analysis of objectives that identifies logical links between strategic goal, specific objectives, and their direct and indirect results. It is normally carried out by stakeholders and presented in a diagrammatical format.

**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.

**Payback Period:** the time essential for a project to recover the initial capital costs (outlays), from the generated financial surplus. In CBA, this is a period needed for the net benefits to equal to the total investment costs.

**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.

**Problem tree:** strategic planning tool that analyses problems looking at their cause and effect relationships. It is presented as a diagram illustrating logical connections between the underlying causes of a problem and their direct and indirect effects.

**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 (and in some cases healthcare) 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.

**SWOT analysis:** strategic planning tool, which allows to identify in a stakeholder exercise internal strengths and weaknesses of, as well as external opportunities and threats to a city, environment sector etc.

**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.

**Transposition:** the process of incorporation of the EU legislation (particularly the directives as regulations and decisions are binding to the EU member states without transposition) into national legislation. In case of the EU candidate and accession countries, this process has to be completed before accession to the EU.

**Unit cost:** Unit cost refers to the total cost divided by the number of metric tonnes or the number of cubic metres of solid waste. 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

The purpose of the guidebook is to provide assistance to local governments on how to organise, implement and monitor cost-effective Municipal Environmental Strategy (MES) using a methodical, step-by-step strategic planning approach. It demonstrates how environmental priorities can be identified and developed into implementable objectives and projects. The guidebook is primarily targeted on the countries in Central and Eastern Europe (CEE) set to join the European Union in 2004, other EU accession countries in the Balkans (eligible for EU assistance funding to cover a part of the costly environmental infrastructure), Turkey, and countries aspiring to the EU membership (and consequently EU environmental standards) such as Ukraine or Serbia. The guidebook can be considered as reference material demonstrating how the ambitious EU environmental standards can be implemented at the municipal level. The guidebook can also be applied in other non-CEE cities with middle income level; however certain sections may not be fully applicable to their infrastructural situation, funding sources and institutional capacities.

This guidebook was prepared as part of the Cities of Change (CoC) project<sup>2</sup>. The methods described in the guidebook have been practically applied in a number of CEE cities including the cities participating in the CoC project. A similar guidebook tackling the issue of strategic planning in municipal solid waste management was prepared by the Bertelsmann Foundation and the World Bank as Cities of Change knowledge product in 2003 (Kobus, 2003).

Most sections of the guidebook are illustrated with examples, case studies, boxes specifying responsibilities and management requirements, and activity boxes for practical exercises. In addition to the MES methodology, the guidebook presents a number of tools that can be applied in making the strategy, such as the EU compliance audit, the SWOT analysis, the problem tree, the objective tree, the comparative risk assessment, the multicriteria prioritisation method, the packaging of measures, the cost-benefit analysis etc.

It is expected that after reading this guidebook, the reader will be able to develop an understanding of:

- the concept of strategic planning for municipal environmental management;
- what is needed to develop an MES;
- how to organise and manage the different stages of the strategic planning process;
- what are the time-frames and responsibilities in preparing an MES;
- how priority problems and objectives can be set;
- how measures can be identified, packaged and appraised.

<sup>2</sup> The Cities of Change project is co-financed by the Bertelsmann Foundation and the World Bank. It is supporting eight CEE cities in applying strategic planning to economic development and environmental management, and it facilitates communication and exchange of experience among the participating cities.

## 2. Strategic Planning Cycle Applicable to Municipal Environmental Management

Successful municipal environmental planning and management addresses the following considerations:

- What environmental problems do we have and why?
- What quality of environment do we want to achieve?
- How can we to achieve it?
- What would be the costs and financial impacts?
- Can the city (the city budget, service providers, households, local businesses–commercial, industrial and institutional sectors) afford it?
- How can we institutionalise and implement our environmental goals?

One of the key instruments applied in municipal environmental management is strategic planning. The key product or output of strategic planning is a *strategy*. Strategic planning applied to municipal environmental management is a cyclic process leading to the development and implementation of the MES. The main components of strategic planning include (see Figure 1): identifying problems based on an analysis of the existing situation, setting objectives to address the problems, appraising objectives and setting priorities among them, generating alternative measures that address each objective, appraising alternative measures and selecting the most cost-effective packages of measures, preparing an action plan that includes a financial plan and an implementation plan, institutionalisation of the MES, and monitoring and evaluating progress to provide feedback for modification and improvement. Usually, several strategic planning cycles (Municipal Environmental Strategies) are developed and implemented before good environmental quality and high standard of environmental services are achieved in a city. Modifications can be introduced to this general methodology depending on the specific conditions and needs of the user. It is important to emphasise that the strategic planning process and its product (the MES) are seen as being equally important. The process is important in terms of capacity and consensus building, as well as building ownership of the MES, and commitment to its implementation. The product (the MES) serves as the reference book guiding environmental improvements in the city in an implementable and cost-effective way.

As shown in Figure 1, the starting point in the strategic planning cycle leading to development of the MES is organising the effort (setting the management structure) for making the MES, and the collection of data. The next step is drafting the Environmental Status Report that should describe the present environmental conditions in the city, project future trends, present the key pollution sources in the city, describe the state of environmental infrastructure (water treatment and wastewater treatment plants, sewerage system, water supply network, waste collection, transportation and disposal/treatment facilities, amenity sites etc.). Then, the key environmental problems are identified looking at primary (causal) and secondary (effect) problems. It is also useful to prioritise the environmental

problems to decide which ones need the most urgent action. Subsequently, the problems identified are translated into policy issues, objectives and targets. Specific and measurable policy targets should be ideally set to address all environmental problems. However, as a minimum, quantitative targets should be set for at least the priority environmental problems.

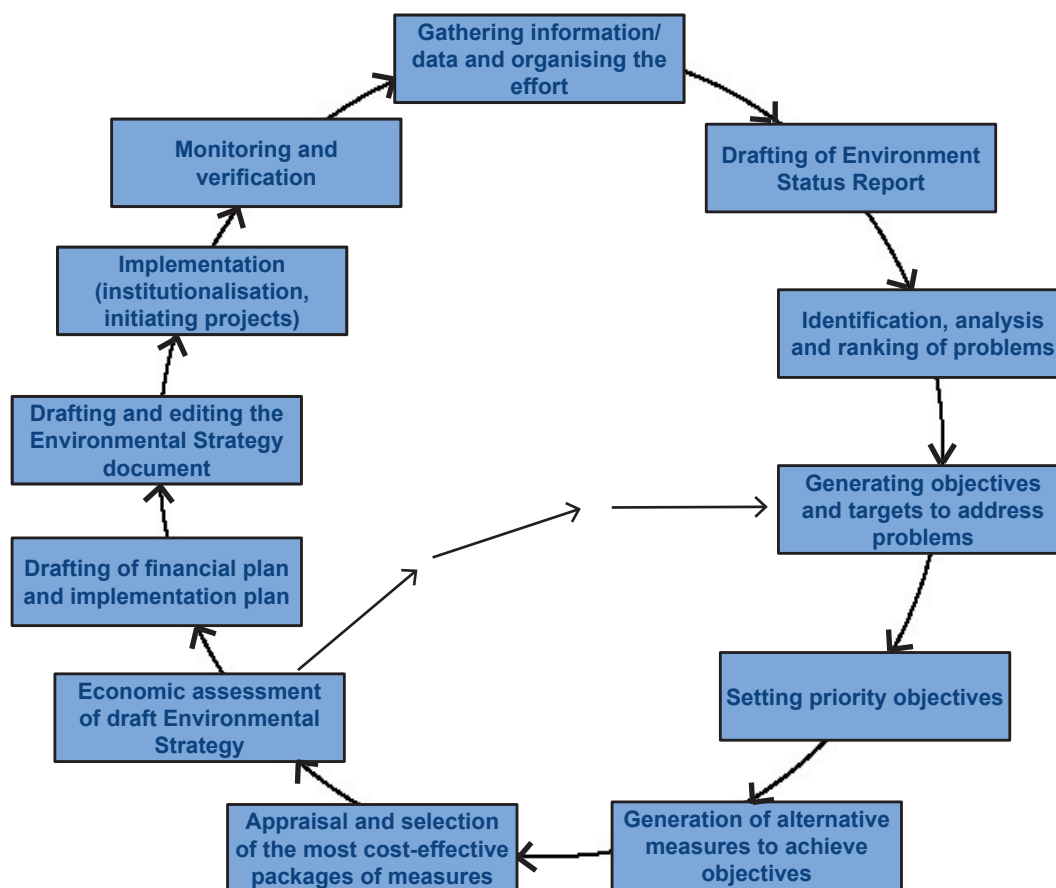


Figure 1. Illustration of a strategic planning cycle for preparing a Municipal Environmental Strategy

The existing municipal strategies and plans relevant to the MES should be also reviewed, and discussions should be held with their implementing institutions to decide which of their objectives are still valid and should be harmonised with the MES. The policy targets and objectives are also subject to prioritisation. However, prioritisation of policy objectives and targets is usually based on the cost-effectiveness criteria (in contrast to health and environmental impact criteria applied to prioritising problems).

The next step is the generation of alternative measures necessary to achieve the environmental objectives (Figure 1). There are a number of measures that can be applied to meet the objectives: investment in the end-of-pipe solutions (such as air filters or sewage treatment plants), preventive investment (converting heating plant boiler from coal to gas or biomass, energy efficiency measures), changes in management, education, monitoring etc. A list of specific measures should be developed for each policy objective. Subsequently, the measures should be



appraised to check whether they are affordable and to choose the most cost-effective packages of measures. Results of the economic appraisal may cause modification of the original environmental objectives, which may need to be revisited and revised (if they are found too ambitious or not sufficiently effective). The process of setting environmental objectives, designing measures to address those objectives, and appraisal of the environmental objectives and measures should be repeated until the most cost-effective and realistic solutions are found.

The following step is matching the funding sources to the MES (drafting the financial plan), and setting implementation responsibilities and time-frames (Figure 1). When this is completed, the action plan document and the project implementation plans are drafted. At this point, the MES document should be put together and submitted for approval by the city council (institutionalisation). After adoption, the implementation begins with preparation and initiation of projects. In parallel, the strategy process needs to be monitored and evaluated on a regular basis (applying an agreed set of progress monitoring indicators).

Development and implementation of the MES is a cyclic process. International experience demonstrates that several cycles of MES development, implementation and revision are required to achieve major progress in improving environmental quality and achieving effective environmental management in a city. It is of key importance that the early phases of the strategic planning, in particular the identification, analysis and ranking of environmental problems and setting policy objectives and targets, are carefully prepared. If these stages are inadequately addressed, the weaknesses and mistakes made tend to multiply in the subsequent stages of the strategic planning cycle. For instance, if important problems are overlooked or causes of these problems are not identified, it is unlikely to develop an effective policy response. If environmental problems are formulated in a general way, objectives tend to be similarly general, and consequently it is not feasible to develop a coherent package of options addressing the policy objectives.

Obviously, each individual MES/environmental policy cycle tends to be different as it reflects specific municipal conditions. These key differences relate to the institutional capacity to develop, appraise and implement the MES, the level of civil society development, and the severity of environmental problems to be addressed.

The following chapters will introduce each step of the methodology presented in Figure 1. 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, and with limited expert involvement. The methodological approach to the MES preparation will be summarised in chapter 10 where the methodological steps will be presented in timeframes (see figure 17).



### 3. Before You Start

Successful application of strategic planning requires its careful preparation and consideration of external conditions that affect environmental management in the city. The first part of this chapter provides an overview of the conditions and effort necessary to start and successfully complete the strategic planning process for environmental management for a city. Participants in the process as well as their assigned roles are discussed. The importance of the participatory approach is highlighted. The second part of this chapter provides the reader with an overview of the objectives and principles of the selected EU environmental directives, as well as the ways in which these directives are most likely to affect municipal authorities. It also suggests the approach as to how the EU environmental requirements could be taken into account in developing the MES.

#### 3.1 What is Needed to Proceed?

The key precondition for successful development of an MES is the political interest of the democratically elected city leaders. The strategy process needs to be well managed, and it is usually appropriate for the city council to supervise the process. Strategy development and institutionalisation usually take at least one year. This allows adequate time for the participation of stakeholders. In brief, the following preconditions should be met in your city to proceed successfully with the strategy:

##### **Internal Conditions:**

- political commitment and support of the city council for developing and implementing the strategy;
- involvement of one person (project co-ordinator, at least part-time) for the duration of the strategy preparation, drafting and implementation process;
- budget available to fund consultants and support the public participation process;
- well-defined and agreed-upon methodology and desired outputs of the strategic planning process;
- sufficient coverage of a whole range of environmental data;
- logistical support by the city hall, including rooms for stakeholder meetings, faxing and photocopying facilities.

##### **External Conditions:**

- established legal framework for making the MES;
- clearly set national environmental targets unlikely to change significantly in the short-term;
- interest and active involvement of stakeholders;
- professional facilitator;
- selection of experienced and qualified experts, particularly for environmental risk assessment, priority setting as well as development and economic appraisal of options.

**Recommendation:** Do not start the strategy making 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 more prudent to concentrate on finding ways to meet the preconditions than to start the strategy making process. Otherwise, the planning process could derail, frustrate and disillusion those involved in it. In particular, insufficient political support from the city council, insufficient budget, national environmental objectives under frequent revisions, and insufficient interest of the stakeholders compromise the quality of the strategy and adversely affect the implementation phase. Consequently, more effort would be required to safeguard the minimum conditions for starting the strategy process, rather than wasting the effort and energy for an ill-prepared process leading to the preparation of a document with little likelihood of its successful implementation.

Activity 1 will help you decide whether the key preconditions for a successful start up of the strategy making process are met in your city.

Environmental strategy making should not proceed if there is a combination of, on the one hand, weak political support and limited financing capacity, and on the other hand 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.



### Activity 1

#### Assessment of internal and external conditions for making a Municipal Environmental Strategy.

**Step 1:** Try to analyse whether the minimum conditions for successfully developing and implementing an environmental 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. involvement of one person (project co-ordinator, at least part-time) for the duration of the strategy preparation and drafting process		
3. budget available to fund consultants and support the public participation process		
4. well-defined and agreed-upon methodology and outputs		
5. sufficient coverage of a range of environmental data		
6. logistical support from the city hall, including rooms for stakeholder meetings, faxing and photocopying facilities		
7. other		
External conditions:	Yes	No
8. established legal framework for making the MES		
9. clearly set national environmental targets unlikely to change significantly in the short-term		
10. interest and active involvement of stakeholders		
11. professional facilitator		
12. selection of experienced and qualified experts		

**Step 2:** If you find that certain pre-conditions are not met, think what can be done to meet them. For instance, if a clear, output oriented 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 budget, or through external assistance. A more difficult issue is to raise interest and commitment among the local politicians and the stakeholders, to obtain a political agreement on the target funding for the strategy, or to cope with significant reshuffle of environmental legislation in your country.

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.....

## 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 process'. The technocratic expert process is typically run by a group of experts who provide specialist input to the strategic planning process based on their specific expertise and analysis but with limited involvement of stakeholders (largely confined to consultation on the draft strategy document). While this approach can bring relatively quick and often technically reliable results, lack of

active participation by stakeholders does not build ownership of the results and commitment to the strategy, and could hamper implementation of actions that need active involvement of the local population.

The alternative is to manage strategic planning as a participatory process involving stakeholders. After all, participation in decision-making is the essence of the civic society to which all Central and Eastern European countries aspire. The stakeholder process is based on a series of technical and stakeholder workshops convened to develop the strategy in a step-by-step approach following the methodological steps presented in Figure 1. The meetings are normally 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 stakeholders 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 strategy and action plan;
- building commitment to implementing the plan;
- reducing opposition to the strategy making process and the strategy document often opposition comes from a lack of knowledge or understanding or even misinformation, but objective information often reduces this opposition.

However, stakeholder participation may have potential disadvantages:

- it may increase the scope for disagreement;
- Stakeholder participation is a time-consuming process, and if not professionally managed may cause delays to the strategic planning process;
- Additional costs.

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

In reality, 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. 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. Certain steps of the strategic planning process need to be undertaken by experts or specialists, including: technology assessment, economic and financial appraisal,

environmental impact assessment, and so on. This expert participation, whether available within the city administration or only externally, should be integrated with the stakeholder process. Chapter 4, which discusses the individual steps of the strategic planning process, will indicate which steps the experts should lead and which steps can be managed by the stakeholders, bearing in mind that interaction between them is always essential.

Before deciding how to apply the participatory process in developing an MES for your city, it is useful to understand the present culture of public participation within your city council. Arnstein's Ladder of Public Participation is a useful tool to identify current participation levels, as outlined in Figure 2 below. The Ladder shows eight different approaches to public participation.

The least advanced rungs are 'manipulation' and 'therapy,' where the community is merely informed about the project (sometimes selectively, e.g. by 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 or even run the decision-making process (see Figure 2).

Participation	Example	Cluster
citizen control	self-government: the community makes the decision	<i>degrees of citizen power</i>
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	<i>degrees of tokenism</i>
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	<i>non-participation</i>
manipulation	community is selectively told about the project	

Figure 2. Different rungs of participation on Arnstein's Ladder

To apply the stakeholder process, it is necessary to decide who are the potential stakeholders for the strategy process in your city. The examples of environmental stakeholders include: city council, local politicians, utility companies (e.g. municipal water companies or electricity generating companies), industrial and commercial companies, 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 politicians, teachers and students etc.

Activity 2 will help you identify the rung of Arnstein's Ladder that best reflects the conditions in your city, and consider how to raise your city's position on the ladder.

### 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 interest. 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 your city, 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 MES.



### Activity 3

#### Identification of stakeholders for the Municipal Environmental Strategy

##### Step 1: Preparation of a long list of stakeholders

Using the guidelines presented below, try to identify and name all potential stakeholders in your city who take part in developing the MES by preparing a long list of stakeholders.

1. Institutions and companies with specific responsibilities for environmental management in your city including city council, water and waste companies, and environmental inspectorate.
2. Organisations with economic interest in environmental management in your city including the key polluters, hotels and tourist companies, waste recycling companies, and potential donors or funders.
3. Organisations with other interest in environmental management in your city including environmental NGOs and/or research institutes.
4. Organisations and/or individuals directly affected, positively or negatively, by the present environmental quality or environmental management practices in your city, including housing co-operatives, groups of residents, local businesses etc.
5. Organisations and/or individuals indirectly affected, positively or negatively, by the present environmental management practice.
6. Organisations and/or individuals not directly affected by the present environmental management practice in your city who feel, however, that they are affected including residents claiming unjustified deterioration of their living conditions due to operation of a wastewater treatment plant, landfill or a new by-pass road.
7. Organisations and/or individuals who may be affected in the future by municipal environmental management practices, including residents living in the vicinity of proposed by-pass roads or new waste disposal and/or treatment facilities.

##### 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 inputs), and solicit their views. This can be done, for instance, with a survey exploring the present level of satisfaction with the municipal environmental services 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 3.) Those who actively respond should be invited to the strategy making process.

##### Step 3: Invitation of stakeholders to the strategic planning process

It is a good practice that the mayor officially approves the list of invited stakeholders and signs invitations for the first stakeholder group meeting. That is a gesture showing the good will of the municipal authorities and active support for, and participation in the project.

### 3.3 The Role of Municipal Authorities in the EU Accession Process

In preparation for EU accession, many countries of Central and Eastern Europe have been altering national legislation, often in ways that will have a profound impact on municipalities. Therefore, it is important that municipal decision-makers and stakeholders understand the philosophy of the EU environmental legislation in order to prepare for the implementation and enforcement of the new national legislation, and reflect the EU environmental requirements in the strategic planning process. In practice, municipal authorities will be responsible for the implementation of national laws and regulations that are not in the discretion of national or regional



authorities or that directly apply to the local level. For example, depending on the municipal environmental responsibilities, municipalities need to make sure that air and water qualities meet EU requirements and that waste management is carried out properly. Sewerage and wastewater treatment plants will have to be built or upgraded. Energy services and waste management will have to be improved for higher efficiency. This is a very demanding task for many municipalities in the EU candidate countries as well as those aspiring for future EU membership.

Bearing in mind the challenges to meet the EU environmental standards, one should also recognise its important benefits, such as the improved public health. For example, according to the EU studies, reaching EU air standards will reduce the number of cases of chronic bronchitis in the candidate countries by between 43,000 to 180,000. In addition, some 15,000 to 34,000 premature deaths could be prevented (Ecotec et al., 2001). The health benefits of improved air quality are not limited to the candidate countries. They will also impact other countries, including the public health benefits worth €6.5 billion annually for the EU countries, as well as cleaner air for Russia, Ukraine or Belarus. In addition to significant health benefits, it is expected that urban environmental investments and modern technology will improve economic efficiency and (companies') productivity. For industry, more efficient waste management brings savings, and better water quality means lower production and maintenance costs, as equipment will no longer be damaged by polluted water (M. Wallström, 2002). The same principle could also apply to municipal infrastructure and would influence its better performance and lower maintenance costs.

This Guidebook is not intended to provide a detailed description of the EU environmental requirements. However, the structure of the EU environmental legislation is explained in this section (more information is provided in Appendix 2.)

The body of the EU legislation is passed as decisions, regulations and directives. Decisions and regulations are binding to the EU member states without transposition, whereas the directives require transposition into national legislation. The majority (about 90%) of EU environmental legislation, known in the EU jargon as the environmental *acquis*, is in the form of *directives*. Directives are designed to impose obligations on member states, but to be flexible enough to enable Member States to implement the requirements using their own legal and administrative systems.

There are several different types of Directives that comprise the EU environmental legislation: framework directives, daughter directives and horizontal (cross-sectoral) directives. The framework directives and the daughter directives are further discussed in this section and in Appendix 2.



*Framework Directives* set out general principles, procedures, and requirements for legislation governing the air, water and waste sectors. The following framework directives are in place:

- the Air Quality Framework Directive (96/62/EC);
- the Water Framework Directive (2000/60/EC); and
- the Waste Framework Directive (75/442/EEC amended by 91/156/EEC).

*Daughter Directives* set specific requirements - pollutant-specific emission limits, technical specifications for infrastructure, criteria for monitoring and reporting – which the EU 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 specifically govern the measures that municipalities will be required to take to achieve compliance with the EU environmental *acquis*.

The most challenging environmental daughter directives in terms of high implementation costs or institutional requirements at the municipal level include (see also Appendix 2):

- the Urban Wastewater Directive (91/271/EEC);
- the Drinking Water Directive (98/83/EC);
- the Landfill Directive (99/31/EC);
- the Packaging Waste Directive (94/62/EC);
- the Environmental Noise Directive (2002/49/EC);
- the Environmental Impact Assessment Directive (85/337/EEC).

The specific daughter directives referring to air, water, waste and noise are described in more detail in Appendix 2. The description of each directive comprises:

- a general overview;
- implementation requirements for municipalities (infrastructure needs, planning and strategy preparation, and public participation); and
- a checklist to identify non-compliant situation relevant to a municipality.

Activity 4 will help you identify the key EU environmental *acquis* compliance gaps of your city.

#### Activity 4

##### Evaluation of compliance with the EU environmental requirements

This activity will help you to assess your municipality's environmental compliance with the EU requirements. The compliance level may be presented in a descriptive manner; alternatively, you may consider setting your own assessment scale.

##### Step 1

List the key environmental responsibilities that are in the discretion of your city administration, and link them to specific legislation in your country.

##### Step 2

Using the information provided in Appendix 2, try to compare your city's environmental management responsibilities to requirements of the specific EU directives looking particularly at: the quality of environmental media, emission levels, availability of environmental infrastructure, technical conditions of environmental infrastructure, monitoring and reporting arrangements etc.

##### Step 3

List the main differences between your present legal requirements related to environmental management and the EU requirements.

##### Step 4

Compile the results of step 1 to 4 in a summary table below:

environmental responsibilities of your city	corresponding national legislation	relevant requirements of the EU directives	compliance level with the EU requirements



### 3.4 The EU Compliance Audit

In order to make sure that your municipality is on the right track to meet the EU environmental requirements, it is useful to audit your performance against the EU standards. This will help you identify environmental objectives that need to be incorporated in the MES. Conducting the *EU Compliance Audit* could be invaluable in this respect. The EU Compliance Audit is a tool that allows to assess the compliance level of local authorities with the EU environmental legislation. It also informs them about their responsibilities and achievements in this respect. This tool was developed jointly by the Umbrella Association of Consultants (Poland) and the Environmental Center for Administration and Technology (Lithuania) and focused on local authorities from those two countries. However, it could be applicable to all CEE countries, after introducing relevant national adjustments. The scope of the audit was limited to the areas that fall within the responsibilities of local authorities in most of CEE countries: air quality (licensing processes, air quality monitoring), waste management (handling of household waste and hazardous waste), water quality (wastewater treatment, bathing water and drinking water), nature conservation (spatial planning instruments), noise from vehicles and machinery (licensing process for industrial plants), providing access to

environmental information and industrial pollution control and risk management (licensing process).

The main part of the audit is a *questionnaire* which is divided into areas which correspond to environmental responsibilities of municipalities. The questionnaire was prepared on the basis of the overview documents that identified the relevant EU directives and referred to national legislation that transposed the specific provisions. In cases where transposition<sup>3</sup> was incomplete, only the obligatory (by national law) requirements or the draft legislation (if existing) were a subject of the review. The structure of the questionnaire included:

#### **Water**

1. Percentage of inhabitants supplied with drinking water which meets EU standards.
2. Existence of a long-term development and modernisation plan for water supply.
3. Existence of a drinking water monitoring system.
4. Existence of a water treatment plant which meets EU quality standards.
5. Existence of a drinking water supply system.
6. Drinking water supply system and related emergency information system.
7. Bathing places that comply with EU standards.
8. Existence of a sewerage system.
9. Existence of a long-term wastewater treatment and modernisation plan.
10. Volume of wastewater treated according to EU standards.

#### **Waste**

1. Existence of a waste management programme in the municipality.
2. Existence of a communal waste management system in the municipality.
3. Existence of a hazardous waste management system.
4. Existence of a landfill and its management.
5. Inhabitants are provided with waste collection, transportation and sorting services.
6. Is the *polluter pays principle* applied to waste management?

#### **Air**

1. Application of an early warning system and dissemination of information to the public when concentrations of SO<sub>2</sub> and NO<sub>x</sub> exceed limits.
2. Is air quality monitoring carried out in the municipality?

#### **Nature conservation**

1. Existence of a nature inventory in the municipality.

#### **Horizontal directives**

1. Procedure for supplying environmental information to the public.
2. Does the local authority keep registers of environmental information?

<sup>3</sup> Transposition: the process of incorporation of the EU legislation (particularly the directives) into national legislation. In case of the candidate countries, this process has to be completed before accession to the EU.

The responses to the questions included in the *questionnaire* were scored on a scale: 0 (full non-compliance) – 5 (full compliance). The scores were dependent on the answers provided by municipalities (qualitative or quantitative, e.g. percentage of wastewater treated). Thus, a local authority's compliance level could be evaluated by an overall compliance value (0-5) across all audited areas (average of all assessment values) or by assessment values in each individual area.

## 4. How to Make it Happen? Preparatory Phase

The aim of this chapter is to guide the reader through the preparatory phase of the MES process. The first section describes how to set the MES process, its management structure and allocation of responsibilities. The next section describes what data should be collected and how, and how to prepare the Environmental Status Report, which describes the baseline environmental conditions for the strategic planning process. The final section presents the SWOT analysis and its application to the MES process.

### 4.1 Setting the Project and the Stakeholder Process

The organisational structure of the project and methodology (reflecting good practice) should be proposed by external consultants and the coordination unit, and agreed with the municipal authorities. Stakeholders should be identified by the coordination unit and invited to the 1<sup>st</sup> stakeholder group meeting (SGM). An official letter of approval from the mayor is recommended. The MES preparation is officially launched with the 1<sup>st</sup> SGM where methodology, inputs and the proposed outputs are presented and discussed.



The development of an MES using the strategic participatory planning approach takes about one year. To ensure that the process is implemented efficiently and timely, it is necessary to set up a framework for project coordination. Its structure differs among various municipalities but it usually comprises: a coordination unit, a stakeholder group, as well as a group of experts providing support on the process management and/or technical issues. Figure 3 illustrates a generic model of cooperation among the key actors involved in the MES preparation.

Depending on the size of a municipality, scope of the project, and local circumstances, a formal *coordination unit* consisting of one or more persons should be established. Ideally, the coordination unit should be led by a municipal officer who would continue his/her role during the strategy's implementation. However, the project coordination role may also be fulfilled by a member of the stakeholder group, an outside person hired especially for this purpose, or a team comprising the municipal officer, stakeholders and external consultants.

The key tasks of the coordination unit include (Figure 3):

- coordination of the inputs and outputs of the MES development;
- management of the MES office (e.g. answering phones and correspondence, managing project budget, sub-contracting experts);
- establishing an MES's information and public relations system (e.g. website, press releases, public meetings, surveys, public events);
- writing up and verifying reports and documentation;
- organising stakeholder group meetings;
- preparation of periodic progress reports and presenting them to the city council and the stakeholder group.

**Recommendation**

When setting-up the organisational structure for the strategy making, consider alternative options that might be applicable to your municipality. Pay special attention to:

- Structure and composition of the coordination unit;
- Lines of communication and reporting among the coordination unit, stakeholder group, other associated groups and the municipal authority; and
- Methods of public participation and project promotion.

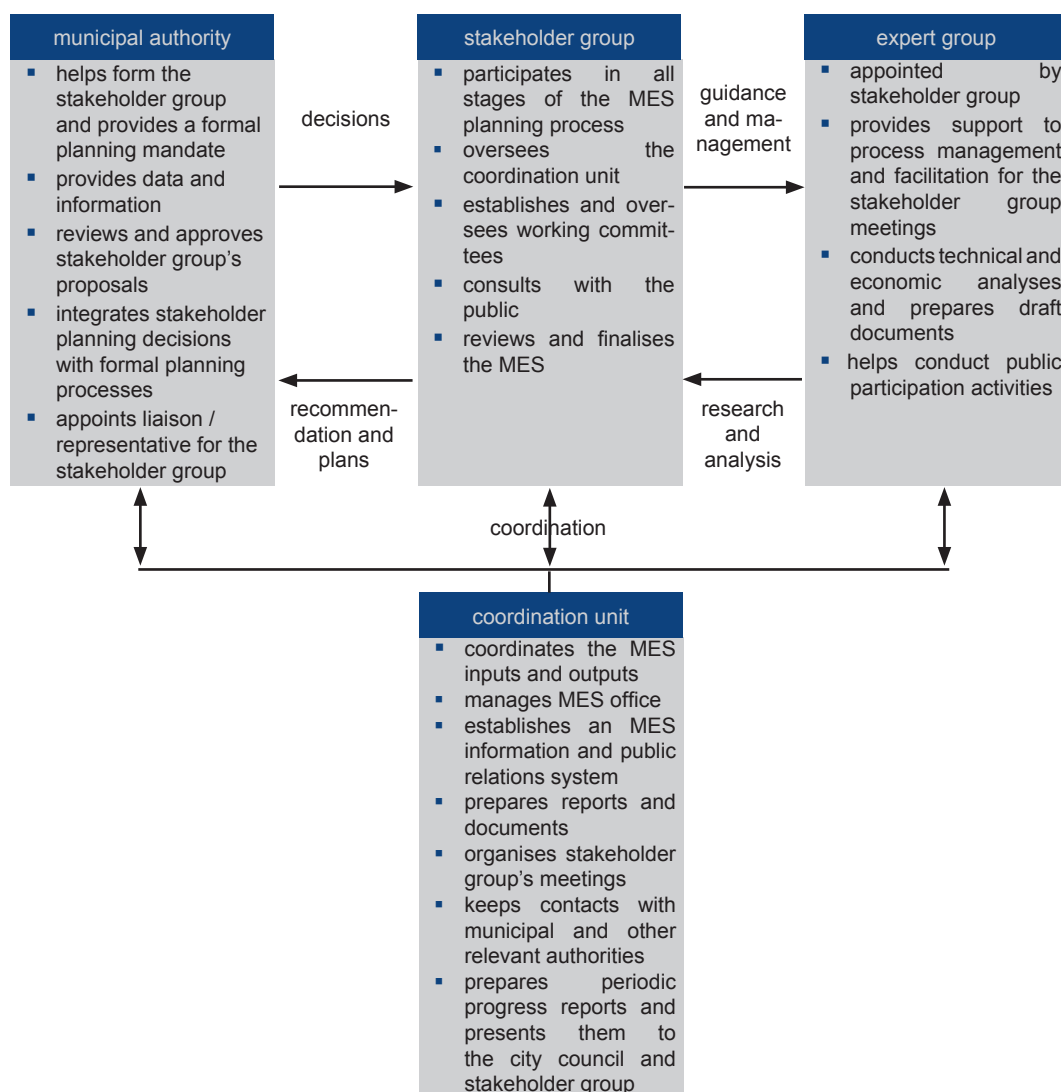


Figure 3: Illustrative organisational structure for the preparation of an MES

The *stakeholder group* includes representatives of stakeholders invited to participate in the MES development. These are individuals who commit themselves to work on a voluntary basis or within their institutional responsibility throughout the entire process of the strategy's preparation.

The more accurately the stakeholder group's composition reflects different interest groups present in the municipality, the greater the likelihood of successful

development and implementation of the MES. It is essential that information about the composition of the stakeholder group is widely publicised so that the local community has the opportunity to get involved in the stakeholder group's work (see Activity 3).

During the first MES preparatory meeting, the project is usually presented and the stakeholder group is formally established. This meeting could be directly followed by the first scheduled workshop of the stakeholder group, devoted to the SWOT analysis, problem identification, rules of the stakeholder group, work plan etc. To make the first meeting more interesting and attractive to a larger audience, it is recommended to organise a related social event, such as an organic food festival, design competition for the MES logo or a school theatre performance on an environmental topic.

In order to function effectively, the stakeholder group should define clear responsibilities, rules of operation and appoint the stakeholder group's facilitator. The experience shows that the process management consultant experienced in the development of MESs is an appropriate candidate for this position. The facilitator would not have to be an environmental management specialist. Although such specialisation would be a valuable skill, more important for this role are the skills of organising and moderating discussions, keeping control over a discussion group, planning, distributing, and controlling the results of work by individual group members, and concluding and summarising discussions.

The facilitator is the guardian of objectivity and impartiality towards all stakeholders involved. International experience shows that the stakeholder group may easily become a substitute ground for local political struggles. Domination of the group's work by any political leaning may lead to subjective appraisals and decisions suited to the immediate interests of supporters or opponents of the municipal authority, and not necessarily supporting a proper solution for environmental problems in the community. It is therefore advisable that the stakeholder group's leader keeps himself/herself above political divisions and co-operates with people of various - including opposite - views.

The stakeholder group's work should be managed at relatively regular programme workshops according to the plan agreed. In periods between workshops, group members and possibly working committees may carry out work as agreed by the group. Working meetings should be primarily used for training, for recommending strategic decisions, and for allocating tasks to the group members and consultants.

When deciding on the MES methodology and detailed work plan, it should be assumed that the stakeholder group meetings should be convened eight to

ten times. Considering that the stakeholder group members act voluntarily, the meetings should be convened once or twice per month. It is further recommended that the key strategic decisions in the MES (such as setting priority objectives or packaging of measures) should be recommended at two-days-away stakeholder group meetings. Away meetings have the additional advantage of helping integrate the group members and forming closer interpersonal ties. This facilitates consensus building and active operation of the stakeholder group during the implementation phase of the MES.

It is also worthwhile including additional attractions for the stakeholder group meetings, such as site visits or study tours to demonstrate significance of certain environmental problems and/or good environmental management practice to show appreciation for the stakeholder efforts and enhance their interest in the project and in their city's needs.

The *expert group* is usually established to provide technical and economic analysis, and take the primary responsibility for the preparation of draft documents. Depending on the size of the municipality, the nature of the existing problems as well as the available budget, there may be one or more specialist committees established who could work on specific issues. Experts involved could be both external consultants and members of the stakeholder group.

In order to clarify the responsibilities of each of the MES actors and their relationship to the municipal authority, it is recommended to prepare a *Memorandum of Understanding* among all the project partners. It may include:

- MES methodology and outputs;
- specific activities that are to be jointly undertaken;
- responsibilities of the stakeholder group, the coordination unit and working committees;
- responsibilities of the stakeholder group facilitator;
- types of information to be shared and standards for sharing information;
- timeframe for completing each MES phase;
- methods for group decision making/conflict resolution;
- recommendations on how the MES will be integrated into activities of implementing institutions; and
- responsibilities of the implementing institutions and a clear indication as to how these can be integrated with their routine duties.



## 4.2 Gathering Information

Data collection is an on-going exercise during the whole strategy preparation process. However, the key stage is the collection of data on the baseline environmental conditions and the current status of environmental management in the city. Data is usually collected by the coordination unit, and the city hall with guidance (and support if required) provided by (external) consultants.



### 4.2.1 INTRODUCTION

Information gathering is one of the most critical and time-consuming stages in the MES development. The responsibility for collection and verification of data, as well as identification of gaps lies usually with the MES coordination unit. Data processing is usually conducted by experts.

First of all, it needs to be identified what data have to be collected and what are the main sources of data. Data should not be collected excessively. Rather, data coverage should be sufficient to conduct technical and economic analyses, and take well-informed decisions. Therefore, new monitoring efforts should be minimised. Instead, in the absence of data, consider the following:

- Collecting data from other cities: data from other cities with comparable conditions provide a perspective for your own community.
- Conducting on-site visits: pertinent information may be gained from site visits and community surveys.
- Talk to the public or conduct a public survey: citizens can provide valuable information.

The possible sources of data include institutions collecting, processing and analysing data, such as:

- the Regional Environmental and Health Inspectorates;
- the Ministries of Environment, Health, Agriculture, Urban Development and Regional Planning;
- universities and academic institutions;
- consulting firms;
- municipal authorities.

You may also consider obtaining necessary data from:

- hospitals and health clinics;
- libraries;
- community organisations (e.g. non-governmental organisations);
- private enterprises;
- individual citizens;
- experts (health risk assessors, ecologists, economists, planners etc.); and
- individuals involved in similar projects in your country or region.

#### 4.2.2 REFERENCE TO NATIONAL AND EU LEGISLATION

When developing the MES, the entire body of the current and the forthcoming legislation that refers to environmental management should be taken into account.

**It is a good practice to prepare and constantly update the list of current and draft legal acts and systematically acquire all those documents in a municipality.**



The EU accession process of the CEE countries is the driving force for many municipal authorities to refer also to the EU legislation when preparing their strategies. In case of municipalities from the EU accession countries, the EU legislation has been transposed into the national legislation. Thus, in practice, there is no need to refer directly to the EU legislation. However, it becomes more complicated when dealing with the forthcoming EU directives, regulations or decisions. In those instances, it is useful to get hold of the EU legislation in the pipeline since it may have a considerable impact on the MES in the medium and long-term.

In case of the non-EU accession countries, which nevertheless aspire for EU membership in the long-term, it is recommended to identify the key requirements in terms of environmental quality and environmental infrastructure that are likely to fall under the municipal responsibility.

#### 4.2.3 COORDINATION WITH OTHER PROGRAMMES

##### NATIONAL PROGRAMMES

Various programmes prepared and enacted at the national (and provincial) government level that refer to environment and sustainable development should be considered in the MES. These documents include *inter alia*:

- the National Development Plan;
- the National Environmental Policy and its Implementation Plan;
- Sectoral Plans (e.g. energy, transport or forestry strategies).

Eligibility for EU assistance funding requires *inter alia* that the MES is consistent with national priorities for EU approximation. Consequently, these priorities and relevant programming documents should be considered in the preparatory stages of the MES.

##### REGIONAL AND LOCAL PROGRAMMES

Municipal environmental strategies and programmes are usually subordinated to regional programmes and strategies. Hence, regional priorities should serve as reference point in setting municipal targets.

Water and waste management are two primary areas that require horizontal coordination of planning efforts among various municipalities and close cooperation with regional authorities. This requires coordination and cross-reference to regional environmental strategies as well as environmental strategies of the neighbouring cities and municipalities.

In the water sector, cooperation is especially important in the context of river basin management that cannot be accomplished without a coordinated management effort of many municipalities within the same river basin.

Efficient and advanced waste management cannot be effectively introduced by a single municipality, especially given the stringent and expensive requirements stemming from the EU legislation. For example, it is usually recommended that a typical modern waste processing and disposal facility should serve between 150,000 – 300,000 inhabitants in order to achieve competitive economic efficiency. When looking at the size of average municipalities or even counties, as well as their financial and management potential, it becomes apparent that this task goes beyond their individual capacities.

Air quality management is challenging due to its transregional movement. Consequently, air quality management usually falls within the scope of regional authorities' responsibilities. Biodiversity issues require also close cooperation with neighbouring authorities when developing an MES. This will help to maintain ecological corridors among various regions and provide adequate protection for natural sites that extend beyond the territory of one municipality.

#### **SECTORAL MUNICIPAL PROGRAMMES**

It is recommended to collect all key strategies, plans, programmes and studies that have been developed and adopted/implemented in the recent years by your municipality. This includes land-use planning and environmental infrastructure planning documents, as well as environmental programmes of industrial enterprises. Careful consideration of sectoral municipal programmes is important to integrate the environmental strategy with other sectors.

Additionally, it is advisable to refer to municipal development plans, considering that they outline major directions for economic and social development. The decisions on environmental management issues, especially related to infrastructure development, should take into account future needs as foreseen in those plans.

#### **4.2.4 TOOLS FOR DATA COLLECTION**

There is a wide array of tools that is available for information collection at various stages of the MES development and implementation. Their selection depends on the local conditions, their applicability for particular stages of the planning process and availability of time, and funding needed for their collection. Usually, a combination of several data collection methods is applied including review of statistical data, environmental monitoring, questionnaires and surveys<sup>4</sup>, environmental audit, application of environmental indicators. In case of budgetary restrictions, statistical data collection, readily available monitoring results and questionnaire surveys can be applied. Figure 4 gives a short description of selected tools for data collection.

<sup>4</sup> A sample questionnaire survey, which can be applied to the MES preparation is presented in Appendix 3.

tool	description	application	limitations	time/cost
review of statistical data	Desk study of available statistical data collected by national, regional and local institutions.	<ul style="list-style-type: none"> <li>baseline data collection</li> <li>identification of data gaps</li> </ul>	<ul style="list-style-type: none"> <li>data from various sources are not always comparable</li> <li>data reliability is difficult to assess</li> <li>methodology is often not known</li> </ul>	days to weeks, \$
data questionnaire	The list of topics should respond to key environmental topics in a city. It is intended to support preparation of a municipal environmental profile. E.g. the UNCHS/World Bank developed a 50 page questionnaire that may be modified depending on the local issues.	<ul style="list-style-type: none"> <li>identification of data gaps</li> <li>comparative analysis</li> <li>development of baseline information</li> </ul>	<ul style="list-style-type: none"> <li>not prescriptive</li> <li>data often not comparable over time, areas, populations</li> <li>variable reliability</li> </ul>	as little as one month/\$
random-sample surveys	This technique involves collecting and analysing a broad spectrum of data on household and neighbourhood environments. It starts with the development of a questionnaire and the selection of a representative sample of households. Questionnaires are sent out or interviews are held. Responses are then tabulated and data are analysed. The survey may be repeated over time for comparisons.	<ul style="list-style-type: none"> <li>development of baseline data</li> <li>monitoring changing conditions over time</li> <li>problem identification</li> </ul>	<ul style="list-style-type: none"> <li>provides only snapshot picture</li> <li>not prescriptive</li> <li>issues are often predetermined by survey designers</li> </ul>	depends on experience and sample size/\$
environmental monitoring	Includes routine monitoring of environmental quality and emission levels; as well as ad hoc monitoring in areas where data gaps were identified.	<ul style="list-style-type: none"> <li>assessment of non-compliance with legal standards</li> <li>comparative analysis</li> <li>benchmarking</li> <li>trend evaluation</li> </ul>	<ul style="list-style-type: none"> <li>requires consistency and accuracy</li> <li>monitoring equipment may be costly</li> </ul>	Permanent usually at regular intervals, \$\$\$-\$\$\$\$
urban indicators	Indicators allow for a static assessment of conditions, monitoring of change over time, and benchmarking. Various types of indicators can be applied: single indicators or aggregated indices, specific indicators, sets of indicators applied by other cities e.g. Sustainable Seattle.	<ul style="list-style-type: none"> <li>development of baseline information</li> <li>monitoring and evaluation</li> <li>comparative analysis</li> </ul>	<ul style="list-style-type: none"> <li>not prescriptive</li> <li>reliability of indicator is only as good as input data</li> </ul>	depends on frequency and level of detail/\$
environmental audit	Applied to check compliance with environmental requirements. Compares the emission and imission levels, technical conditions of environmental infrastructure, monitoring and reporting arrangements with those required by law. Usually carried out by experts.	<ul style="list-style-type: none"> <li>ad hoc assessment of legal compliance</li> <li>problem identification</li> </ul>	<ul style="list-style-type: none"> <li>requires external experts</li> <li>snapshot picture, does not indicate trends</li> </ul>	depends on scope, \$\$\$-\$\$\$\$
rapid urban environmental assessment	Rapid urban environmental assessment is a process that builds on data and analysis to clarify issues, involve stakeholders, set priorities, and achieve political consensus for action. The assessment consists of three steps: 1 - assembly of existing data; 2 - analysis of environmental conditions and causal relationships; and 3 - public consultation (Leitmann, 1994). Data are collected from a range of sources, including the urban questionnaire, routine monitoring, information on existing infrastructure and services, epidemiological and other health statistics, information on natural resources and systems.	<ul style="list-style-type: none"> <li>Identification and prioritisation of issues and options</li> <li>data and methodology for decision-making</li> <li>input to strategic process</li> </ul>	<ul style="list-style-type: none"> <li>requires political commitment to follow-up</li> <li>can be subject to political manipulation</li> </ul>	months/\$\$

Figure 4: Tools for data collection (Leitmann, 1999, modified)

### 4.3 Drafting of the Environmental Status Report

Detailed guidance for drafting the Environmental Status Report should be provided by external consultants. The coordination unit and the city team should be drafting the report with active support provided by the consultants (who may be requested to draft certain sections of the report, review and edit it). The 2<sup>nd</sup> SGM is convened to review and discuss the draft Environmental Status Report and identify environmental problems (link to the next step).



The preparation of an objective *Environmental Status Report* is a necessary prerequisite for developing a sound MES. The report should be holistic and cover all aspects of environmental management in the city. Any ignored or omitted issues are likely to have a knock-on effect in the later stages of the strategic planning process and delay the delivery of final product.

The *Environmental Status Report* helps us address the following questions:

- Where are we (description of the baseline conditions at the starting point)?
- What do we have (inventory of resources and infrastructure available for environmental management, city's strengths and limitations)?
- What are our concerns (what issues require actions, what environmental quality do we aspire for)?

The assessment of baseline conditions is the first task of the stakeholder group within the strategic planning process. The *Environmental Status Report* should not focus on environmental management only. Financial, economic and management issues will play an important role in reaching the MES objectives.

The results of the *Environmental Status Report* are usually compiled in the form of a short and straightforward report (approx. 25-40 pages), which provides the basis for the identification of problems and the setting of strategic objectives. The report is subsequently incorporated in the MES document. The *Environmental Status Report* typically includes (see also Figure 5 for an example of a table of contents of an Environmental Status Report):

- inventory of local natural environment (geographical location, natural conditions, biodiversity including sensitive areas, natural resources, tourism and landscape amenities etc.);
- assessment of the state of the environment, key pollution sources, non-compliant situations including the identification of environmental problems;
- the level of environmental awareness, public perception of environmental management in the city, operation of environmental NGOs etc.;
- environmental infrastructure along with its capacity and technical conditions (good road network, existing wastewater collection and treatment facilities, natural gas network etc.);
- description of relevant strategies, plans and programmes (e.g. the Local Economic Development Strategy, Water Management Strategy etc.);
- description and analysis of the municipal environmental services (including the quality and reliability of services, level of charges, operational and investment costs, cost recovery etc.);

- assessment of the financial standing of the city and the local population (including financial risk rating, borrowing capacity, purchasing power of residents etc.).

<b>1. Introduction (all sub-sections should include future trends)</b>
1.1 General information about the city
1.2 Population
1.3 Demographics
1.4 Economy
1.5 Natural conditions
1.6 Income level
1.7 Social conditions
1.8 Health profile of the population
1.9 Land use planning
<b>2. Related sectoral strategies, plans and programmes</b>
<b>3. Environmental infrastructure:</b>
3.1 Sewage treatment plants
3.2 Sewerage system
3.3 Cesspits
3.4 Drinking water abstraction points
3.5 Drinking water treatment plant
3.6 Waste treatment facilities
3.7 Coverage of waste collection system
3.8 Air pollution abatement installations
3.9 Noise abatement installations
3.10 Monitoring system
<b>4. Management of natural resources</b>
4.1 Surface water
4.2 Groundwater
4.3 Nature and forests
4.4 Mineral resources and soil
<b>5. Pollution sources (i.e. point, linear and dispersed sources, reference to national law)</b>
5.1 Industry
5.2 Commerce
5.3 Transport
5.4 Communal
5.5 Agriculture
5.6 Waste treatment facilities
5.7 Contaminated sites
5.8 Other
<b>6. Ambient environmental quality ('imissions') including compliance with national standards</b>
6.1 Air
6.2 Surface water
6.3 Groundwater
6.4 Drinking water
6.5 Soil/land
6.6 Ambient noise
6.7 Nature and green areas
<b>7. Financing of environmental management</b>
7.1 Ownership and management of environmental infrastructure
7.2 Past and planned major infrastructure projects including their sources of funding
7.3 Operational costs related to the level of tariffs (i.e. cost recovery policy)

Figure 5. Table of Contents of the Environmental Status Report applied by the cities of Ostrow Wielkopolski (Poland) and Pazardjik (Bulgaria)



Activity 4 will help you identify data gaps and data collection tools needed to prepare the Environmental Status Report.

#### Activity 4

##### Identification of sources of data, data collection methods and data gaps

- Step 1: Using the list of tools for data collection (Figure 4) and the content table of the Environmental Status Report (presented in Figure 5) prepare a summary table, which will specify data sources and data collection tools for each component of the Environmental Status Report.
- Step 2: Indicate where data gaps are likely to occur.
- Step 3: Propose ways of addressing the data gaps, such as additional surveys or monitoring.



## 4.4 The SWOT analysis

The SWOT analysis should be conducted by the MES stakeholder group with assistance provided by a professional facilitator.



The SWOT analysis (**S**trengths, **W**eaknesses, **O**pportunities, **T**hreats) can provide a useful contribution to the Environmental Status Report and to the identification of problems. It is one of the methods which can be used for the evaluation of city's potential and limitations in relation to environmental management. *Strengths* and *weaknesses* are generally considered 'internal' to the community, whereas *opportunities* and *threats* are considered 'external'. It is important to evaluate both the internal strengths and weaknesses of your city as well as external forces affecting your city. For example, high environmental awareness can be regarded as an internal strength, while availability of environmental loans or grants by environmental funding institutions is an external opportunity. On the contrary, poor environmental awareness can be regarded as internal weakness, and lack of national financial support for municipal programmes can be considered as external threat.

Since the *Environmental Status Report* should examine not only the environmental status of the municipality but also related socio-economic issues, the *strengths and weaknesses, opportunities and threats* analysis should also refer to:

- local natural conditions (local natural terrain, biological diversity, natural resources, tourism and land assets etc.);
- human potential (availability of qualified labour, involvement in community matters, environmental awareness etc.);
- environmental infrastructure (state of the roads, wastewater collection and treatment facilities, water supply, access to natural gas connections etc.);
- economic potential (development of specific branches of industry, farming, trade, future trends, purchasing power of the population, income disparity etc.).

Activity 5 is designed to help you consider environmental management in your city in terms of strengths, weaknesses, opportunities and threats.

### Activity 5

#### Conducting the SWOT analysis

The SWOT analysis can be a good warming-up exercise for the stakeholder group prior to the commencement of the more challenging stages of the strategic planning process. It also helps the stakeholder group's members to identify themselves with their municipality and integrate within a group of individuals. The results of this exercise provide a useful contribution to the *Environmental Status Report* and to problem identification.

Divide the participants into four small groups, each working on one of the following areas of the case study: environmental quality and local natural conditions, institutional capacity, technical infrastructure, and economic potential. Each group is to prepare a SWOT analysis for its individual area in 45 minutes and then present and discuss their work with the other groups.

Some recommendations:

- Prepare the SWOT analysis on a flipchart in a tabular format, following the format:

<b>Strengths</b>	<b>Weaknesses</b>
<b>Opportunities</b>	<b>Threats</b>





## 5. How to Make it Happen? Strategic Phase: Identifying, Analysing and Prioritising Problems

This chapter will guide you through the process of identification, analysis and ranking of environmental problems. It will present alternative methods for problem analysis such as the problem tree analysis and the comparative risk assessment. The chapter is concluded with a brief discussion on various approaches to priority setting. The stage of the strategic planning process described in this chapter requires a strong element of stakeholder participation, and it creates foundations for the subsequent stages of strategy preparation.

### 5.1 Identification of Environmental Problems

Problem identification should be conducted by stakeholders at the 2<sup>nd</sup> SGM supported by an experienced facilitator. Expert involvement at this stage should be limited to methodological guidance. The coordination unit compiles and disseminates the results.



Identification of environmental problems in your city should be based upon the information collected for the *Environmental Status Report*, the stakeholder group's collective knowledge and the results of any conducted Questionnaire Surveys (see Appendix 3). The problem identification is conducted during the second meeting of the MES stakeholder group, and its findings are often integrated in the *Environmental Status Report*.

When identifying environmental problems it is important to look at the following issues:

- quality of the local environment and its components (e.g. air, soil, underground and surface water, and acoustic climate);
- point pollution sources and their impact on the environment (e.g. industrial plants, extraction facilities, heating plants, municipal wastewater treatment plants, cesspit tanks, solid waste disposal sites, illegal dumps, and high voltage electricity transmission lines etc);
- non-point pollution sources (such as traffic, agricultural run-off);
- the population's access to environmental resources of suitable quality (e.g. drinking water, recreational opportunities);
- rational use and management of local natural resources, including land-use, devastation of valuable natural areas, and loss of natural resources;
- local population's state of health (i.e. infant mortality, occupational diseases, and the inhabitants' life expectancy);
- availability and conditions of the environmental infrastructure including wastewater and drinking water treatment plants, sewerage system, waste disposal and treatment facilities as well as by-pass roads.

The list of environmental problems should include concerns that exist today as well as possible future problems. For example, the landfill site may not pose any significant risks at present but it may create serious explosive hazard if the methane collection system is not installed. To help determine potential risks, ask “what if” questions, such as: “If pollutants leaked from the landfill, what effects might this have on people’s health and/or the environment?”

It is expected that the members of the stakeholder group will come up with a long list of environmental problems which can be grouped within various categories. Initial problem identification can be carried out at one plenary meeting of the stakeholder group, and their related threats can be analysed later.

Figure 6 below presents an example of environmental problems grouped into five areas. In this particular case, the criterion for the problem grouping was a pollution source. However, other criteria are also used commonly for classifying environmental problems, such as: media categories (e.g. air, water, soil); stressors categories (e.g. heavy metals, SO<sub>2</sub>, ash deposits); or impacts categories (e.g. respiratory diseases, deteriorated land, changed ecosystem). The categorisation of problems is helpful when making the problem analysis since it presents the problems in a systematised manner and introduces the logical order of cause-effect relationships.

<b>No.</b>	<b>Pollution Sources</b>
<b>I.</b>	<b>Mining and processing</b>
1.	Feldspar exploitation in Brezoi
2.	Salt exploitation in Ocnele Mari
3.	Limestone exploitation in Bistrita
4.	Lignite exploitation in Berbesti
<b>II.</b>	<b>Energy sector</b>
1.	Heating systems
<b>III.</b>	<b>Other industries</b>
1.	Chemical platform
2.	Wood processing
3.	Leather production
4.	Tourism
<b>IV.</b>	<b>Infrastructure</b>
1.	Thermal waters and sewage systems
2.	Domestic waste waters
3.	Solid waste
4.	Road transport
<b>V.</b>	<b>Agriculture and forestry</b>
1.	Animal farms
2.	Deforestation
3.	Erosion

Figure 6. List of problems identified in Valcea County (Romania) and classified according to pollution sources (REC, 2001)

## 5.2 Analysis of Environmental Problems

There are various methods used to analyse environmental problems. The municipalities, depending on their size, local circumstances, data availability or just local preferences, may choose among them. This manual proposes two out of many available tools that can be selected optionally for this purpose:

- the problem tree analysis, and
- the comparative risk analysis.

### 5.2.1 The Problem Tree Analysis

The *Problem Tree Analysis* is a relatively easy-to-use tool that can be applied by the stakeholder group without extensive preparatory work, training and expert support. The *problem tree analysis* also provides solid basis for the next stage of the strategic planning process – setting of objectives. Unfortunately, in some municipalities, this tool may not prove to be sufficient, since it does not lead to prioritisation of problems. Consequently, additional prioritisation techniques need to be applied (see section 5.3).

The *Problem Tree Analysis* involves identification of problems in a hierarchical order using the cause-and-effect relationships between these problems. The key purpose of this analysis is to identify the “root causes” of problems and address *them* rather than their effects. A medical analogy can be used to explain the philosophy behind this method: If you have chronic joint pain and take a painkiller to treat it, you are treating the symptom, not the cause of the problem. The painkiller merely masks the indication (pain) of what could be a serious underlying health problem, which if left untreated may worsen. When the painkiller wears off, the problem returns. In addition, your body will slowly develop a resistance to the painkiller. Over time, larger doses of painkiller will be required to treat the same pain. *Projects which only address the symptoms of problems, and not the root causes, are therefore unlikely to bring about sustainable benefits.*

The problem tree is a diagram that graphically illustrates the logical connections between various problems. (An example of a problem tree is presented in Figure 7.) The simplified example shows only some selected causes and effects related to the core problem in order to illustrate the use of this tool. In practice, the problem trees are much more complex and include more complicated relationships among the problems. Therefore, it is often recommended to break problems into smaller components and develop individual problem trees for narrower problems.

It should be emphasised that the *problem tree analysis* is not a scientific method. It is based on the need for reaching a consensus, a common understanding of problems, within a stakeholder group. However, collective knowledge can be subjective. Therefore, it is advised to cross-reference the problem tree with the Environmental Status Report and with other sources of information on environmental problems.

A comprehensive and clearly presented *problem tree analysis* provides a sound foundation for developing a set of relevant and focused project objectives during the next stages of the MES development.

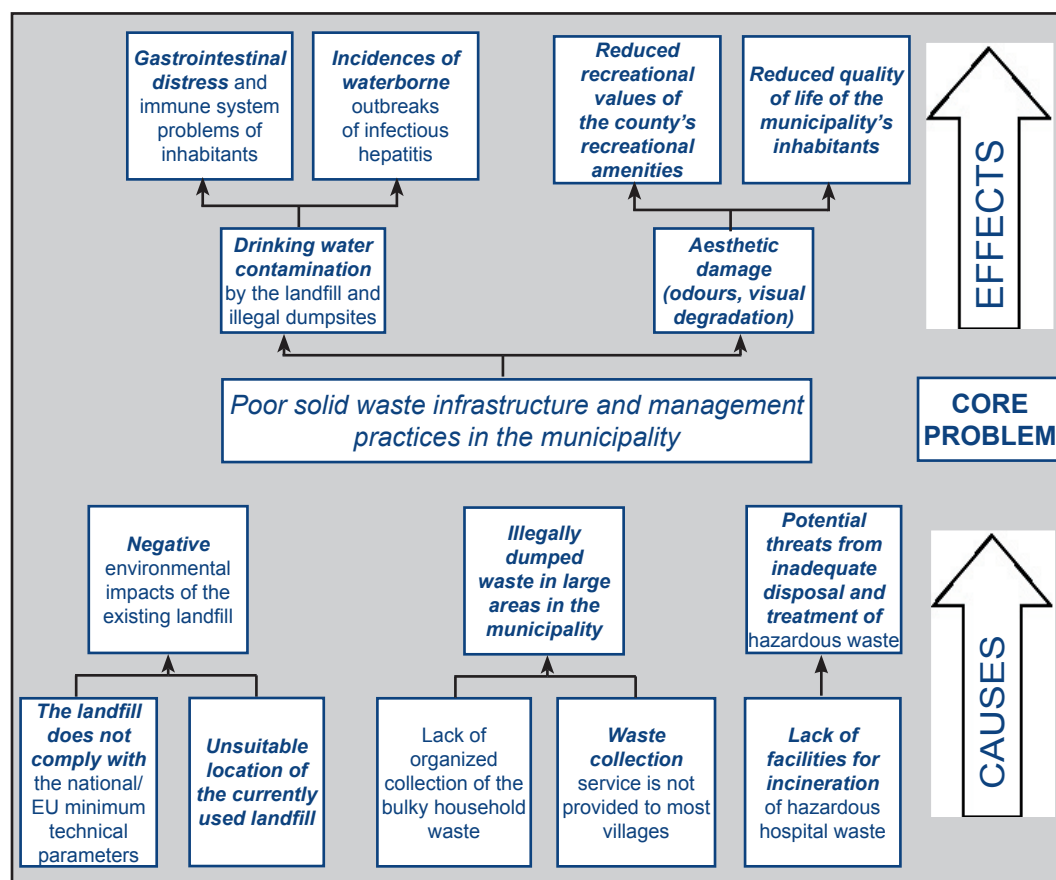


Figure 7. Illustration of a problem tree

Activity 6 will guide you through the development of a problem tree.

### Activity 6

#### Development of a problem tree

This exercise is based on the problem areas identified in the SWOT analysis (Activity 5). The stakeholder group should be divided into smaller groups. Each group is allocated one problem area of the SWOT analysis (the weaknesses column). The group starts the exercise by selecting one core problem within the problem area. The remaining problems should be placed in the problem tree, according to whether they are *causes* (leading to the core problem) or *effects* (resulting from the core problem). The causes are listed below the core problem in the tree diagram, and the effects are placed above. Subsequently, the group should analyse further the causes and effects of the core problem. It should be considered ‘what brings about the causes?’ and ‘what are the secondary results of the effects?’ Timing: 60 minutes. Each group should present its problem tree to the plenary.

Practical recommendations:

- Write the problem (causes/effects) on “Post-it notes” (one per “Post-it note”) and then stick them to the flipchart, because usually it is unrealistic to put all the problems in the right logical order the first time. Using the “Post-it notes” makes corrections very easy.
- Avoid including very general problems in the tree (e.g. institutional corruption, lack of money) which affect not only the issue in question but also other problems — treat them as general constraints and move them to the side of the main problem tree.



## 5.2.2 The Comparative Risk Assessment

The Comparative Risk Assessment is a relatively complex methodological tool, which is usually applied by experts and the MES stakeholder group as joined exercise.



Cities with a large number of significant environmental problems that were not properly analysed in the past may consider applying the *Comparative Risk Assessment (CRA)* methodology. The CRA helps to analyse and rank environmental problems, and it points out where resources can be targeted to achieve the greatest improvements of community health and well-being. The disadvantage of the CRA methodology is that it is relatively complex to follow; it requires extensive data collection and processing as well as substantial expert support. In addition, cities accessing the EU in the near future should focus on achieving the EU environmental requirements and priorities, which may differ from the comparative risk assessment results.

The CRA developed by the U.S. Environmental Protection Agency in the late 1980s, is an analytic methodology for comparing environmental problems in a systematic way based upon the best available information about the relative risks these problems pose. CRA attempts to answer the question, “given what we know at this time, which environmental problems pose the greatest risks to our health, the natural environment, and the quality of our lives?” The answers to this question, generated through a risk ranking exercise, can lead directly into a priority setting exercise in which risk information can be integrated with other non-risk factors (e.g. public preferences) to develop an action plan for addressing high-risk problem areas.

The application of the CRA methodology at the municipal level usually involves the following steps (see Figure 8 for a practical illustration):

1. *Description of each identified problem*, looking at the relationships among human activities (*sources*), environmental pollutants (*stressors*) and their impacts on human health, natural environment and quality of life (*effects*) described separately for air, water and soil.
2. *Determination of criteria for the assessment of threats* to human health, natural environment and quality of life. Examples of criteria include:
  - *criteria for health threats* (a greater number of malicious cancer cases or other illnesses, additional cases of hospitalisation etc.);
  - *criteria for environmental threats* (changes in the number of species and the functioning of ecosystems, impact on natural resources with irreversible consequences or reversible effects over a specific period of time);
  - *criteria for threats to quality of life* (access to natural resources, inhabitants' sense of discomfort at a specific time and at different intensity level).

A useful approach is to draw-up general criteria for each of the three categories mentioned above: threats to health, natural environment and to the quality of life. However, it is also possible - and seemingly easier - to develop criteria to evaluate each of the identified problems separately. If the second option is applied, one should anticipate difficulties in comparing different threats with each other. This approach would also require to determine a scale to assign appropriate values to different sets of criteria. The scale may include: extreme risk, high risk, significant risk, low risk and no risk (Podgajniak, Wiszniewska, Choromanski, 2000). Joint discussion and agreement on the selection of criteria will enable the stakeholder group members to get to know their own systems of values and exchange views. This, in turn, will contribute to building a common platform of agreement regarding the actual importance of the different threats and the choice of measures to address the threats. For these reasons, a considerable amount of time should be spent for discussions at this stage. This will pay off at later planning stages.

3. *Assignment of qualitative values to risk levels for the agreed criteria:* It is advised that the scales of the criteria are divided into 4-6 risk level categories (extreme risk, high risk, significant risk, low risk or no risk). It is also recommended to match them with the corresponding categories of actions (emergency action, immediate action, action when planning is completed, less urgent actions that can await careful consideration, monitor etc.).
4. *Assigning qualitative risks related to each of the problems:* After the criteria for assessing the threats have been determined (i.e. a scale enabling comparison of the importance and significance of specific threats in the place concerned), the risk related to each of the problems identified in each category may then be analysed: risk to health, risk to the environment, and risk to quality of life). For this purpose it will be necessary to gather and appropriately process data needed for the application of the criteria determined earlier.

Nevertheless, it must be remembered that the risk assessment made by the stakeholder group, even with the involvement of experts, is not a detailed scientific study. Above all, it is a support tool for priority actions. Consequently, if shortage of initial data occurs, it is possible to apply assumptions for the criteria based analysis. In such cases the rule should be that the least desirable (but probable) situation is assumed for the aspect concerned.

The *least desirable scenario* rule is applied in most qualitative and quantitative risk assessment methods. In cases where despite unfavourable assumptions the result of the criteria based assessment is reassuring, the undoubted advantage of such a rule is the possibility of ignoring the problem concerned with a clear conscience. On the other hand, an unfavourable result should in such cases be treated as a signal suggesting, most importantly, that the actual level of the threat must be investigated, and another risk analysis conducted on this basis.

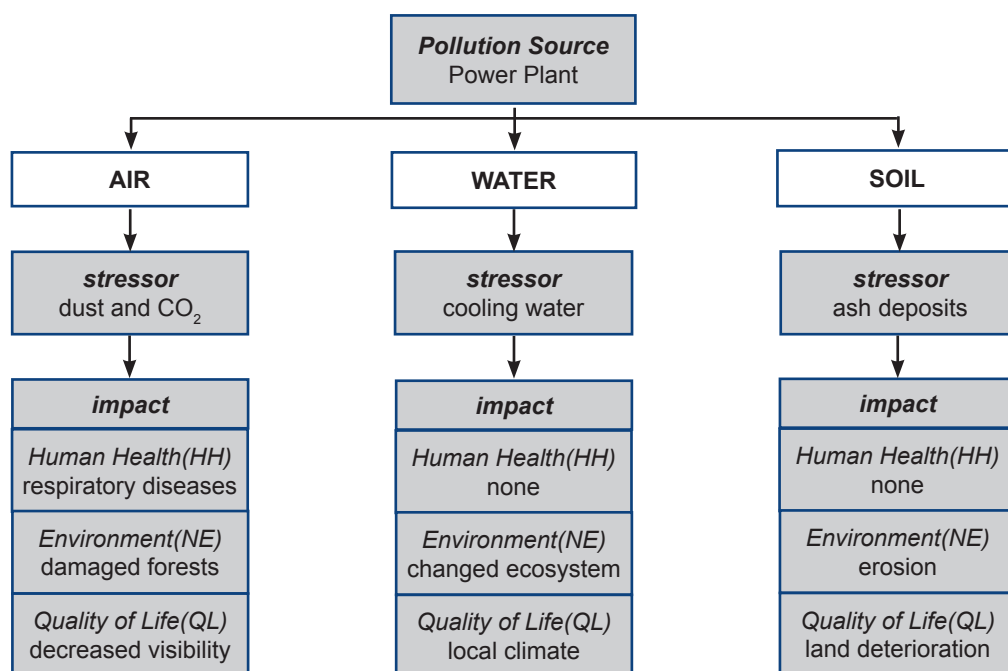


5. *Comparison of risks related to each of the problems:* At this stage, the impacts on human health, natural environment and the quality of life are ranked separately for air, water and soil, using the earlier agreed criteria. Each of the problems (pollution sources) can be described by up to 9 different risks. This in fact reflects the actual ranking of environmental problems.
6. *Presentation of a quantitative ranking table, using a scoring system:* Once the risks have been assessed in a qualitative manner, it is useful to assign to them quantitative values, which are needed to establish environmental priorities based on risk assessment. The evaluation scale used for this purpose is usually linked to the assessment criteria for threats to human health, natural environment and quality of life.
7. *Presentation and discussion of ranking results:* It is important that the stakeholder group proceeds to the next, the planning stage with an agreed short list of environmental problems in the city, presented in a descending order of ranks. To do that, it is worth organising an open ranking session and invite all key stakeholders to participate. Such an arrangement enables a broad public presentation and discussion on what has been achieved so far in the MES making and what corrective actions need to be taken. At this stage, it is also useful to compare the problem ranking results with the public survey's findings (for instance, in the Valcea County, the public survey results showed very similar results to those achieved in the CRA study; see Figure 8).

The agenda for the problem ranking session should include in particular:

- a presentation of the risk ranking methods;
- a presentation of the risk analysis results, discussing in particular the methods of data analysis, areas of uncertainty, and the initial assumptions made and published data used; and
- putting the threats in the order of importance.

## 1. Example of the problem description for Valcea County.



## 2. Below are two examples of alternative sets of criteria that were used for assessing the threats to human health in two CRA communities. The same sets of criteria were used to demonstrate various ways of developing criteria tables within the CRA.

Criteria table for assessing threats to human health Additional cases of terminal cancer (Chelm, Poland)	
Qualitative scale	Description
<b>Extreme risk</b>	at least 1 additional case per 1,000 people (at least 15% of national average)
<b>High risk</b>	1 additional case per 10,000 people (about 10% of national statistical average)
<b>Significant risk</b>	not more than 1 additional case per 100,000 people (0.5% of national average)
<b>Low risk</b>	1 additional case per 100,000 people (about 0.05% of national statistical average)
<b>No risk</b>	not more than 1 additional case per 1,000,000 people (less than 0.05% of national statistical average)

## 3. The example of qualitative values assigned to risk levels for agreed criteria. This activity is usually undertaken in parallel when developing criteria tables as shown above (Valcea, Romania).

Risk Level	Need for Action
Extreme risk (E) High risk (H) Significant risk (S) Low risk (L) No risk (N)	Top emergency situation Act immediately Act after planning what you want to do Plan action and try to prevent risk increase Monitor

## 4. Comparing relative risks – the results of this stage of the process are described in more details in the Chelm Case-Study (Appendix 1) in the section concerning risks posed to human health, environment and quality of life.



5. Qualitative ranking of risks for all impacts described for each problem (Valcea, Romania). This table was developed by applying the scale presented in Stage 3 (selected results only).

No.	Sources	Water			Soil			Air		
		HH	NE	QL	HH	NE	QL	HH	NE	QL
<b>I.</b>	<b>Mining and processing</b>									
1.	Feldspar exploitation in Brezoi	E	E	N	N	S	S	S	N	S
2.	Salt exploitation in Ocnele Mari	N	N	H	0	H	H	0	N	S
3.	Limestone exploitation in Bistrita	N	N	N	0	H	H	N	N	S
<b>II.</b>	<b>Energy sector</b>									
1.	Heating systems	0	0	0	0	0	0	E	H	S
<b>III.</b>	<b>Other industries</b>									
1.	Chemical platform	N	S	N	0	H	S	0	0	S
2.	Tourism	N	S	S	0	0	0	0	0	0
<b>IV.</b>	<b>Infrastructure</b>									
1.	Domestic waste waters	H	H	H	0	0	0	0	0	0
2.	Solid waste	0	0	0	S	H	S	S	E	H
3.	Road transport	0	0	S	0	N	S	E	S	S
<b>V.</b>	<b>Agriculture and forestry</b>									
1.	Animal Farms	L	N	E	0	0	0	0	0	0
2.	Deforestation	0	E	S	0	H	N	0	0	0

6. Presentation of ranking results in a quantitative manner, including the scale established for assigning quantitative values (Valcea, Romania, selected results only).

No.	Sources	Water	Soil	Air	Total
<b>I.</b>	<b>Mining and processing</b>				
1.	Feldspar exploitation - Brezoi	11	7	7	25
2.	Salt exploitation - Ocnele Mari	6	8	4	18
3.	Limestone exploitation - Bistrita	3	8	5	16
<b>II.</b>	<b>Energy sector</b>				
1.	Heating systems	0	0	12	12
<b>III.</b>	<b>Other industries</b>				
1.	Chemical platform	5	7	3	15
2.	Tourism	7	0	0	7
<b>IV.</b>	<b>Infrastructure</b>				
1.	Domestic waste waters	12	0	0	12
2.	Solid waste	0	10	12	22
3.	Road transport	3	4	11	18
<b>V.</b>	<b>Agriculture and forestry</b>				
1.	Animal Farms	8	0	0	8
2.	Deforestation	8	5	0	13
<b>Total</b>		<b>71</b>	<b>58</b>	<b>62</b>	<b>200</b>

No.	Scale of risk assessment criteria	Symbol	Points
1	very low	N	1
2	low	L	2
3	significant	S	3
4	high	H	4
5	extreme	E	5

7. Presentation and discussion of ranking results (Valcea, Romania)

1. Infrastructure (solid waste and domestic waste waters)
2. Salt exploitation in Ocnele Mari
3. Road transport
4. Feldspar exploitation in Brezoi
5. Limestone exploitation in Bistrita
6. Chemical platform
7. Deforestation
8. Heating systems

Figure 8. The use of simplified CRA approach in the Valcea County (Romania) and Chelm (Poland) case-studies

### 5.3 Setting Environmental Priorities

This step should be undertaken during the 2<sup>nd</sup> SGM with active facilitation of an experienced consultant who provides methodological guidelines and process management. If problems identification and analysis takes longer, an additional SGM may be required to complete the ranking of environmental problems.



Setting environmental priorities is an important component of the strategic planning process. Prioritisation can be applied at various stages of strategy preparation depending on the object of prioritisation. Prioritisation can be applied to:

- key problems in order of importance/severity;
- objectives that need to be most urgently addressed (e.g. reduce traffic emissions or improve quality of drinking water);
- actions supporting objectives (usually large number of actions are required to achieve an objective, e.g. improving air quality in the city);
- projects (e.g. investment projects from the long list of projects that require municipal funding);
- project alternatives (e.g. should we increase separate waste collection applying multi-bag system, bring-sites or home composting).

Priority setting is not a magic tool, which can put all municipal environmental management back on track. It has advantages and limitations (depending on methodology applied). Generally, priority setting is useful to:

- identify key problems in an objective way;
- identify issues that require most urgent action;
- minimise bias and lobbying in decision-making where scarce resources are competed for;
- achieve maximum objectivity and transparency in making strategic decisions and in allocating funds;
- enhance credibility and transparency of the strategic planning process;
- structure our thinking about problems, objectives and projects;
- compare cost and benefits of alternative actions;
- choose from amongst alternative courses of actions those ones that are most cost-effective;
- allocate scarce resources to key areas.

There is no standard methodology that can be applied to all cases of priority setting. Each individual priority setting requires tailor-made methodology, which will be different in relation to problems, objectives or projects<sup>5</sup>. However, it can be concluded that priority setting is useful when objective and transparent methods are applied. The key methodological difficulty is that ideally one measuring rod is required to compare the objects of prioritisation (problems, objectives, actions or projects). Often monetary units are applied to compare alternatives. The Cost-Benefit Analysis allows to quantify and compare costs and benefits, and choose those projects that have the highest benefit to cost ratio.

<sup>5</sup> More details on prioritisation of objectives and projects can be found in a similar Cities of Change knowledge product dealing with strategic planning in solid waste management (Kobus, 2003).

However, environmental and social externalities (such as the benefits of clean water or psychological effects of unemployment) are difficult to express in monetary terms and hence the CBA is often biased.

This section deals primarily with prioritisation of environmental problems. A number of methods can be applied in this respect, including comparative risk assessment, problem tree and multicriteria analysis. As it was demonstrated in Chapter 6.2, the CRA methodology is a useful tool that allows prioritisation of environmental problems based on the risks posed on human health, natural environmental and quality of life. The *Multi-Criteria Analysis* is another useful tool for this purpose. This method can also be used in other stages of the MES development, e.g. for prioritising goals or selecting alternative solutions. However, each of these cases requires a different set of prioritisation criteria. Ranking of problems is usually based upon relative seriousness or severity of environmental problems. However, it is often combined with other criteria, such as:

- public preferences;
- municipal discretion to manage;
- community ability to influence; and
- legal requirements.

Since criteria are not equal weight, a system of weights and scores may need to be applied. Results of multicriteria priority setting are usually presented in a summary table where each problem is listed against prioritisation criteria, scoring and weighting system.

Activity 7 will help you set environmental priorities using the multicriteria approach.

### Activity 7

#### Setting environmental priorities

The purpose of this exercise is to practice the multicriteria approach to setting priority problems. The exercise should be undertaken by the stakeholder group. Timing: 60-90 minutes. The following steps will be taken:

- Step 1:** Discuss the environmental risks of each of your identified environmental problems. The discussion should be based on real data provided by the CRA analysis or the Environmental Status Report.
- Step 2:** Draft a list of criteria that can be applied to systematically prioritise problems identified in your city (use examples presented above). Decide which criteria are most important and place weights on them.
- Step 3:** Discuss each problem by looking at each prioritisation criterion and allocate scores (e.g. score 3 for significant positive impact and score 0 for lack of impact).
- Step 4:** Fill in the prioritisation matrix shown below (the selection of prioritisation criteria shown below is illustrative only):

Environmental Problem	Criteria (including weights, if relevant)				Priority
	CRA results	Total cost	City's discretion to manage	Public support	



## 6. How to Make it Happen? Strategic Phase: Generating Objectives and Targets to Address Problems

This chapter will guide you through the stage of developing a community vision, setting strategic goals and generating specific objectives. It also presents objective tree analysis – a useful method for analysing and refining objectives.

This step requires strong participation of stakeholders and advanced facilitation. During the 3<sup>rd</sup> SGM, the problems identified in the previous steps should be converted into objectives under the methodological guidance provided by an experienced facilitator. A brainstorming session should be set up to create the community vision and consequently supplement the list of objectives converted from problems. The Objective tree analysis and the ranking of objectives should be carried out at the 4<sup>th</sup> SGM (strong technical input and facilitation by experts is required).



### 6.1 Development of Community Vision and Strategic Goals

The next step in the MES preparation is the development of community vision and strategic goals. This is usually done at the 3<sup>rd</sup> MES stakeholder group meeting. The meeting could start with an exercise to create a community vision. It may be organised as a brainstorming session during which the stakeholder group members agree on a common vision for their community for the next 20-30 years. This vision does not have to be—and should not be—limited to environmental protection issues alone. On the contrary, the desired image of the future should be as comprehensive as possible and should contain indications of new opportunities and threats that may arise as a result of its realisation.

The description of the desired vision for the future as presented in the MES is usually about one page long. However, its summary may be boiled down to one sentence and/or a slogan. This vision will provide the direction for defining strategic goals whose implementation is necessary for turning the vision into reality.

Strategic goals should:

- define a desired positive state, and guide the strategy's implementing bodies in their efforts;
- give direction to the development of detailed implementation strategies for each specific objective;
- reflect the expectations of the stakeholder group and local inhabitants;
- address problem areas identified in the previous stages, but also go beyond solving specific problems; and
- be in accordance with national and regional policies, yet focus on the city's needs.

Examples of strategic goals could be: “increased ecological awareness of inhabitants” — or a more measurable one — ‘atmospheric pollution reduced to levels within the national or EU norms’.

## 6.2 Setting Specific Objectives

The next step after defining the strategic goals is dedicated to developing specific objectives. Specific objectives should:

- ensure that their fulfilment will eliminate, or at least minimise, the problems defined in earlier stages;
- focus on ways to reach a strategic goal rather than reflect the expectations of the stakeholder group; and
- be formulated in a manner that eliminates, to the greatest possible degree, any element of uncertainty in the strategy's implementation.

The generation of specific objectives can be undertaken in three steps. First, the environmental problems identified and analysed in the previous stage should be converted from the negative to positive statements (see Figure 9 for a practical illustration on how this can be done). The positive statements are in fact specific objectives. They should be reviewed to make sure that they are clearly formulated. Secondly, the list of specific objectives should be grouped and compared with the strategic goals to check whether they sufficiently reflect and address them. Additional strategic objectives should be formulated to fully address the strategic goals. Finally, the specific objectives should be converted, as far as feasible, to measurable targets.

environmental problem	specific objective (response to problem)
lack of by-pass road in the city causing excessive transport emissions, noise and traffic congestion in the city centre	to build by pass road for the Łódź – Wrocław and Poznań – Katowice highways by 2010
illegal discharges of stormwater to wastewater sewers, and occasional flooding of streets and cellars during heavy rains	to construct 120 km of stormwater sewers in peripheral parts of the city by 2012
insufficient area and poor management of green amenity sites in the city	to regenerate the 3 <sup>rd</sup> May Park, and plant trees and bushes along the main streets in the city by 2007
illegal dumping of bulky waste in the outskirts of the city	to set up bulky waste bring-site centre in the city by 2005

Source: Based on the Municipal Environmental Strategy of Ostrów-Wielkopolski, Poland (simplified)

*Figure 9. Illustration of how environmental problems can be converted into specific objectives.*

Ideally, all specific objectives should be SMART (Specific, Measurable, Achievable, Relevant and Time related). It is important that specific objectives are clearly worded and include an implementation time-frame thus avoiding problems with interpretation during the next stages of the strategy making process. Examples of *specific SMART objectives* include: "All wastewater is to be channelled into the sewers for treatment by the year 2010," or "5 percent water-consumption reduction by the year 2005." When the list of specific objectives is completed, it is useful

to set priorities amongst them to decide which ones should be addressed first and which ones can wait. Multicriteria analysis is recommended here as a useful prioritisation tool (compare with section 5.3).

### 6.3 The Objective Tree

An example of a good method that may be used for setting strategic goals and specific objectives is the *Objective Tree Analysis*. It resembles the problem tree analysis (described earlier), following an assumption that when the root causes of problems are found and addressed, the secondary (causal) problems can be solved. However, the logic behind defining various levels of objectives is different from the one used in drawing a problem tree (Figure 9). In case of a problem tree, we try to establish a hierarchy among various identified problems whereas the construction of an objective tree starts with the formulation of a main/strategic objective that pre-defines other more specific objectives.

Therefore, we start by rephrasing the core problems, causes and effects into positive statements and thus building a positive tree, which is an approximate mirror image of the problem tree (see Figure 10). Well-developed objective tree diagrams provide a good starting point for the formulation of specific actions.

Activity 8 will help you understand how the Objective Tree can be developed.

#### Activity 8

##### Building an objective tree

The exercise is done by the same groups that worked on problem trees together. Their task is to convert negative statements (core problems, causes and effects) into positive statements (strategic goals, goals and results). For example: “insufficient treatment of waste water” could be converted into “effective wastewater treatment.” The groups should work for approximately one hour, and after completion they should present and discuss their objective trees with each other.

Some recommendations:

An objective tree does not have to be a complete mirror-reflection of the problem tree. Two objectives can address one problem (e.g. the problem “weak public awareness” could be reformulated into “high environmental awareness of the public” and “good information systems”).



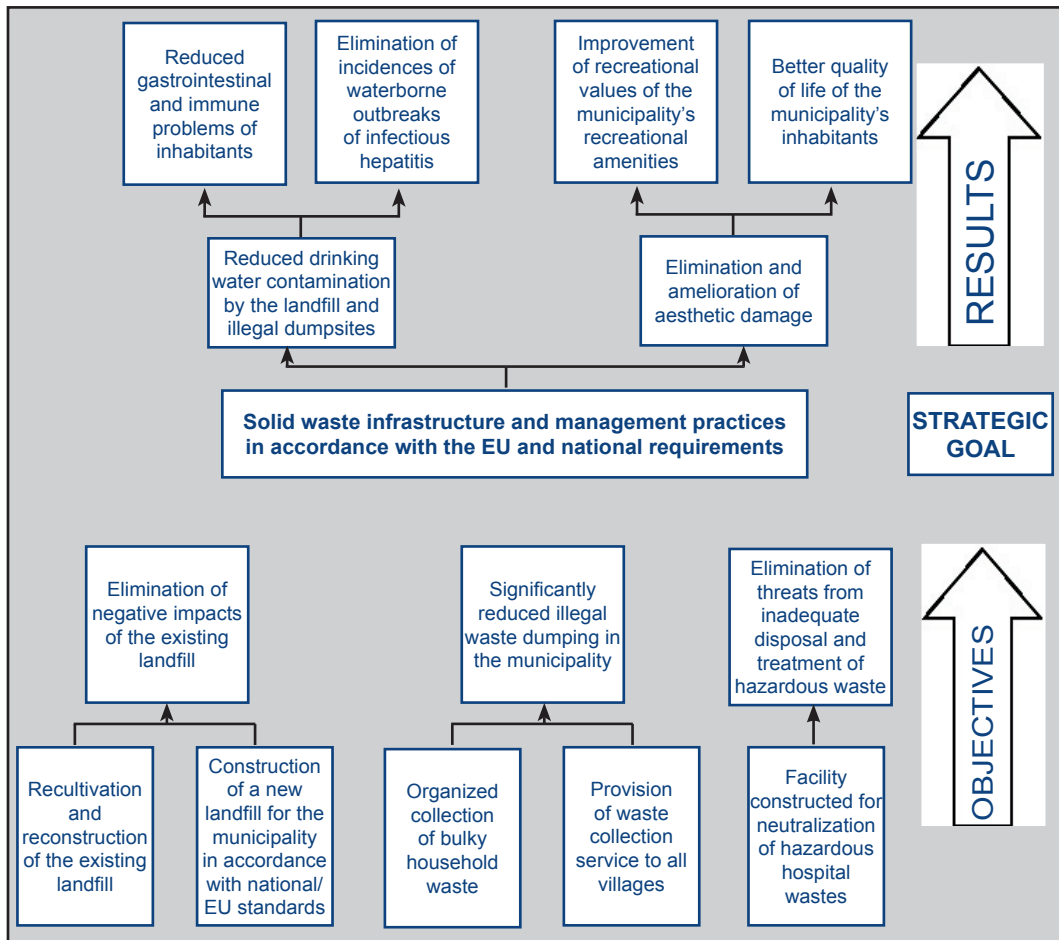


Figure 9. Illustration of an Objective Tree



## 7. How to Make it Happen? Strategic Phase: Selection of Alternative Measures to Address Objectives

The aim of this chapter is to help you identify measures to address each specific objective, appraise those measures and choose the most cost-effective packages of measures for each objective. The first section discusses how measures can be identified. The second section presents a selection of *hard* investment measures, and the third section shows selected *soft* measures. The final section gives an overview of methods for the appraisal and packaging of measures.

### 7.1 Identification of Measures

The long list of measures addressing specific objectives should be first identified at the 5<sup>th</sup> SGM. It is important to review and consider measures stipulated in the existing programmes, projects, designs and studies. Verification of measures with a view to achieve consistency and mutual reinforcement of measures should be done by experts' or technical working groups.



Once specific objectives are defined and prioritised, specific measures should be developed in support of the objectives. In other words, at this stage of the strategy development it is clear what needs to be done but it is yet to be decided how to do it in a most cost-effective way. Potentially, there are many alternative ways (measures) to achieve the objectives. The selection of measures (see next sub-section) include: environmental infrastructure and technology investment projects, local by-laws, enforcement, economic incentives and tariff policy, institutional reform, planning, management, education and awareness raising etc. The key challenge is to select the most feasible and cost-effective approach.

The following principles of environmental policy should be applied to guide generation of alternative measures (see also Figure 10):

- pollution prevention *at source* rather than applying the *end of pipe* measures; in other words, focusing on the causes of pollution rather than mitigating their effects;
- minimisation of pollution and environmental stress by application of the best available technology not entailing excessive costs;
- full application of the *Polluter Pays Principle* and *User Pays Principle*; in other words, charging the polluter the full costs of clean up and preventing expenditure, and charging the user of environmental services with full costs of service delivery;
- environmental awareness raising principle – one of the key outputs of each environmental measure should be building better understanding of environmental issues and changes in behaviour in production and consumption;
- partnership and shared responsibility – setting and meeting environmental objectives is possible only in partnership with all relevant stakeholders (the residents, businesses and industry, local government, environmental authorities, NGOs, interest groups etc.).



The identification and selection of measures should start with a review of the current legal and economic instruments, technology, techniques and management choices that are considered effective in addressing the strategy objectives. This task should be entrusted to internal and external experts.

The next step is to review the current municipal plans and programmes for environmental management and related fields (especially those being currently implemented). The ongoing or forthcoming projects should be screened to check which of them support particular objectives. Such projects should be taken into account even if there are currently more modern or more effective approaches to achieve the given strategy objectives.

Preventing pollution and conserving natural resources—rather than cleaning up—should be a basic principle of your municipality's environmental strategy. Pollution prevention is the process of identifying and eliminating areas, processes, and activities that create excessive waste by-products, which are released into the environment. This is a cost-effective approach, which minimises the costs of cleaning up pollution. Here are just a few examples:

*Conserve water!* A community-wide effort to conserve water can help your municipality in several important ways. Excessive exploitation of an aquifer lowers the water table and consequently reduces the yield, and may cause the deterioration of the chemical composition of water. High water usage also means that more wastewater is generated that needs to be managed. Some simple steps—such as starting a leak detection programme and using water-saving devices in houses—can help to prevent these problems and avoid the cost of building additional drinking water and wastewater facilities.

*Do not dump used oil!* Used oil should be recycled or disposed so it will not pollute the environment. Even small amounts of used oil spoilt on the ground or surface water can contaminate the drinking water source of an entire community. Your used oil should be taken to a collection center or service station that can handle it properly. The community is responsible for providing a market for the used oil or ensure its safe disposal.

*Safely dispose household hazardous waste!* Many common household products (e.g. most cleaning fluids, disinfectants, pesticides, and paint thinners and removers) contain hazardous constituents. Dumping these household hazardous wastes down the drain, into the garbage can, or on the ground can contaminate ground water, surface water and soil.

*Save energy!* This is something every resident can do to prevent pollution. Power plants burn oil, coal, or gas to generate electricity. Burning these fuels creates air pollution. If less energy is needed, less air pollution is produced. Saving energy can also save you money. Your community should promote energy conservation through public service announcements and other means.

*Protect the area around your drinking water wells!* A large number of municipalities have incidents of contaminated ground water. If you protect your water source before it gets contaminated, you can avoid some major costs, such as the costs of sophisticated treatment equipment, cleanup and remediation, consulting and legal fees, water rate increases, and even reduced real estate prices.

*Do not be a throw-away community!* Landfill space is becoming limited, and building a new landfill that protects water, soil, and air from contamination is expensive. At the same time, people keep generating more and more waste. Try to reuse materials instead of throwing them away. Try to recycle glass, plastic, aluminium, and paper. Do not buy products with extra packaging that has to be thrown away.

*Do not litter!* If everyone helps, the cost of litter collection and management can be reduced. Your environmental plan should also include teaching community residents about pollution prevention. Pollution prevention is a "mind set"—a way of looking at the world and the way we live. If everyone reduces pollution in his or her own life, the community, its environment, and the future will benefit.

*Source: United States Environment Protection Agency (1994, p.38).*

Figure 10. The use of the pollution prevention principle in selecting alternative solutions

Considering a range of issues which should be addressed in an MES, a long list of potential measures should be developed for each MES objective. In order to do this in a systematic and structured way, it is necessary to focus on separate thematic areas which together make up the overall system. In many cases alternative options can be considered. For instance, waste recycling targets can be achieved through separate collection at source or through a sorting facility for mixed waste. (Figure 11 illustrates an approach to the generation of alternative measures.) In order to achieve a specific objective (for instance, *elimination of untreated wastewater discharges into a lake*), five tasks were identified, and then alternative measures were generated showing how those tasks could be achieved. For some tasks there is only one solution, while for others there are several. In fact, it is not necessary to have alternatives for all issues; if there seems to be no realistic alternative to some solutions, there is no need to create artificial proposals which are not feasible.

After identifying alternative solutions, an appraisal is necessary in order to compare them and develop an optimal package for achieving certain specific objective. In most cases, the appraisal and selection of solutions require additional analyses and research to be done by experts. Therefore it is suggested to develop comprehensive alternatives only for priority objectives, which should be achieved/implemented in the nearest future. Additionally, it is important to have only a few potential measures for selection, otherwise excessive effort would be required to evaluate and compare them.

tasks	alternative measures				
	option 1	option 2	option 3	option 4	option 5
provision of wastewater sewerage network to the whole town area	channelling of all wastewater (alternatives at the level of specific projects)				
mobilising population to connect to the sewerage network	education	one tariff for water supply and wastewater disposal	obligatory connection to the collection network	financial incentives	mixed system
treatment of all wastewater from the sewerage network	channelling of all wastewater to 2 existing municipal WWTPs*	channelling of all wastewater to 2 existing WWTPs*, and one industrial	modernisation of the largest municipal WWTP* taking all wastewater from the town		
treatment of rain water from urban areas	channelling of rainwater through the rainwater collection system	retention of rainwater in the lake's catchment area	mixed system		
elimination of illegal wastewater discharges	education, inspection and monitoring				

\* WWTP- Wastewater treatment plant

Figure 11. Alternative solutions for a specific objective - Elimination of untreated wastewater discharges to the lake

## 7.2 Types of Measures to be Considered: Hard Investment Measures

Direct investment measures are often seen as prerequisites for environmental improvements. They include infrastructure (e.g. installation of a biological wastewater treatment unit within the existing wastewater treatment plant, extension of the sewerage system, construction of a new water intake, construction of a bypass road) and technology type measures (replacing coal boiler by gas boiler in the municipal heating plant, introduction of water saving technology in a paper mill). These are powerful tools that can be used to protect or improve the environment and provide visible effects. However, they incur high costs and require most careful consideration regarding the planning and designing process. It is quite common that municipal authorities would like to solve problems as soon as possible and sometimes do not put enough effort to plan adequately a technical facility. The over-designed wastewater treatment plant or a solid waste processing plant which cannot acquire sufficient volumes of waste from the region are well-known illustrations. Another problem comes from applying end-of-pipe solutions which address only the effects of a problem and not its cause. An example of such an investment is the enlargement of an overloaded water treatment plant instead of eliminating leakages from a water supply system.

The sections below present some considerations for alternative hard investment measures that can be included in an MES (based on United States Environmental Protection Agency, 1994).

### 7.2.1 DRINKING WATER

#### ***DRINKING WATER TREATMENT***

Drinking water must be treated to protect human health. Unfortunately, at present in most cases, water extracted from natural resources needs treatment before it can meet drinking water standards. It means a water conditioning station should be constructed. However in most medium-sized towns with a centralised water supply system, such conditioning stations already operate. If there is a problem with drinking water, it is usually related to an outdated technology or insufficient capacity resulting from the increased demand for drinking water. When developing the MES, it should be decided whether there is a need to construct a new water conditioning station, modernise the existing one or perhaps apply some other solutions. Therefore, it is necessary to prepare in the early stages of the strategy making the Environmental Status Report, which includes the description of capacities and technical conditions of the existing environmental facilities. That will help to consider strategic options and select an optimal one.

Different types of treatment processes tend to be used for ground water and for surface water conditioning. The major types of drinking water treatment include *disinfection*, *removal of organic and inorganic matter*, and *filtration*. Although

filtration is sometimes used for groundwater sources, this process is primarily used for surface water. Proper *disinfection* kills pathogens (viruses, bacteria and some parasites). The process that communities use most often is chlorination, where chlorine gas or hypochlorite solutions are added to the water. *Removal of organic contaminants* (such as pesticides and solvents) and *inorganic contaminants* (such as nitrate and lead) is important if drinking water contains any of these substances at a level that might be harmful to human health. For smaller towns, the most suitable technologies for removal of organic contaminants might be aeration, which strips certain organics from the water to the air, or granular activated carbon treatment, in which water passes through especially treated carbon particles that have an extensive surface area onto which the organics can attach. In few cases the additional *removal of inorganic contaminants* might be required. *Filtration* removes particles of solid matter from water, usually by passing the water through sand or other porous materials. It also helps to control biological contamination.

#### ***DRINKING WATER QUANTITY: LEAK DETECTION***

Finding and preventing leaks can save a lot of water. A *water audit* compares the total quantity of water produced with metered water consumption. If the total metered water usage is less than 85 percent of the total metered water production, a system-wide leak detection survey should be conducted. Distribution pipes, treatment facilities, and water pumps - all can be sources of large leaks. Finding a leak can be difficult and expensive. Fixing the leak, which often involves excavating covered pipes, can also be costly. However, if the leak is severe, the expense can be justified.

#### ***DRINKING WATER QUANTITY: CONSERVATION***

People can do many simple things to use less water. The example includes the use of low-flow shower heads and toilets, placement of a filled plastic bottle in the toilet tank, or closing a tap while brushing teeth. Every litre of saved water is one litre less extracted from the resources, pumped, treated, and delivered to a consumer. A water conservation programme can consist of updating building codes, conducting public education, promoting conservation through financial incentives, such as higher water rates or scaled charging systems. For example, a powerful tool to reduce water consumption is an installation of water meters in houses and flats, or in the next stage, the introduction of regressive user charges, which charge customers who use more water at a higher fee per water unit used. These charges penalise usage beyond basic requirements and encourage people to use less so that they can save money.

### **7.2.2 WASTEWATER**

Municipal wastewater must be properly managed to avoid public health problems and pollution of water resources. Three types of wastewater handling systems can be used: on-site systems, cluster systems, and centralised systems. Most municipalities might need a combination of these systems, such as on-site systems in sparsely populated areas, cluster systems in small residential subdivisions, and centralised systems in more populated or commercial areas. However, it should be taken into account that in accordance with European Union requirements, all settlements over 2,000 population equivalent units have to be provided with a sewerage system (with some exceptions in the suburbs that could be served by on-site systems).

#### **CENTRALISED SYSTEMS**

In densely populated areas, where multiple cluster systems are needed and on-site systems are not practical, a centralised wastewater system might be necessary. However, constructing conventional sewers to collect the wastewater is almost never practical for smaller municipalities because of prohibitive costs. Conventional sewers usually account for over three-quarters of the total cost of a conventional wastewater collection and treatment system. The high cost of constructing the sewer system might be acceptable on an individual household basis, however, if no pumping stations are required. Alternative designs are almost always cheaper under the same circumstances. Alternative small-diameter gravity, pressure, and vacuum sewers can save 25 to 50 percent of the capital cost of wastewater collection in smaller municipalities.

Many types of technologies are available for treating wastewater at a centralised plant. Natural treatment technologies use natural processes associated with soils, vegetation, or wetland environments to treat wastewater and include land treatment, lagoons, slow sand filters, and constructed wetlands. These systems generally require larger land areas than mechanical systems. The wastewater must be treated (usually by sedimentation or in lagoons) before application to land, filters or wetlands. Mechanical treatment technologies use engineered facilities that treat large volumes of wastewater in a relatively small space. They require more skilled attention and energy to operate and are less sensitive to changes in climate compared with most natural systems. Mechanical systems appropriate for small communities include trickling filters, oxidation ditches, and sequencing batch reactors. All of the above treatment systems are usually capable of meeting the required standards for the discharge to surface water. All treatment systems produce some amount of sludge, which must also be treated and/or properly managed. Sludge treatment systems reduce the sludge volume by removing water (dewatering). They can reduce the number of pathogens in the sludge and reduce its attraction for insects, rodents, and other organisms through digestion, composting or application of lime. Spreading treated sludge on the land to improve the soil or placing it in a landfill are the most common disposal methods for small communities.

Depending on the wastewater discharge standards that apply to a given municipality, a centralised wastewater treatment facility should most probably be required to treat the effluent before discharging it into a water body.

### **ON-SITE SYSTEMS**

Septic systems handle the wastewater from individual residence on-site. These systems are very common in small communities where houses are dispersed. Septic systems consist of a tank that retains the wastewater solids and a drainage field (leachfield) where the tank effluent is distributed. In the leachfield, natural processes purify the liquid as it drains through the soil. Conventional septic systems work best on large lots with deep, permeable soils. A variety of alternative on-site system designs are available to accommodate a range of difficult site and soil conditions. The most appropriate system depends on factors such as how permeable the soil is, how high the water table is, and how shallow the bedrock is.

Poorly sited, designed, installed, or maintained septic systems can result in surface ponding in yards. Surface ponding that continues for an extensive period is considered a health hazard and requires corrective action. Because maintenance is the only factor that can be controlled once an on-site system is installed, a programme of periodic inspection and/or pumping is advisable. This approach, combined with public education to ensure that owners are putting only appropriate materials down the drain, is the easiest action to implement.

Although individuals usually own septic systems, a community can take a variety of steps to maintain effective systems, including:

- periodically inspecting the system and requiring pumping when necessary;
- requiring an operating permit that must be renewed periodically to ensure maintenance;
- keeping files of all septic system locations and maintenance performed;
- requiring prior approval by the town or county health officer of all repairs and replacements; and
- setting up a fund to help homeowners with needed repairs or replacements.

The most important way to improve the performance of an on-site system is to conserve water. This reduces the volume of water the system has to handle. Detecting and repairing leaky faucets and toilets, using low-flow showerheads, toilet dams, low-flush toilets, and faucet aerators, and eliminating wasteful water use habits can all conserve water.



## **CLUSTER SYSTEMS**

A cluster system normally uses low-cost alternative sewers to collect wastewater from homes in the area and transfer it to a reliable, low-cost, easily operated treatment/disposal facility. This type of system can be suitable for developments or neighborhoods of up to 100 homes but it is often used for smaller groupings.

Several types of alternative sewer systems can be used to collect and transport wastewater from individual houses to the treatment facility. The treatment facility is usually a larger version of an individual on-site system, such as subsurface soil absorption systems or sand filters.

As with any treatment system, a maintenance programme is essential to ensure the proper operation of a cluster system. Compared with conventional collection and treatment systems, cluster systems require minimal maintenance. The maintenance programme, however, should always be in place and clearly spelled out to homeowners who use the cluster system.

### **7.2.3 SOLID WASTE**

The best approach to solving municipal solid waste problems is an integrated solid waste management using a **combination** of techniques and programmes to manage the municipal waste stream. An integrated system is designed to address a specific set of local solid waste management problems, and its operation is based on local resources and funding sources.

The idea behind integrated solid waste management is that a combination of approaches can be used to handle targeted portions of waste stream. Local officials should consider a series of activities, each of which is designed to **complement** the others. For example, a recycling programme can have positive impacts on the development of a waste-to-energy facility. Source reduction, recycling, combustion, and landfilling can all have positive impacts on the local municipal waste management problem.

To reduce waste management problems most effectively, regions, municipalities, and the waste management industry should first consider source reduction —reducing the amount and toxicity of the solid waste generated. Recycling of recoverable waste materials is the next most desirable approach. Finally, composting, incineration, and landfilling complete the solid waste hierarchy. Suitable combinations of these alternatives should be considered in an integrated management programme.

For small municipalities, **regional cooperation** in solid waste management offers several advantages. Municipalities that join forces can share the resources needed to

promote reduction at the source and operate recycling and composting programmes. For example, municipalities can often obtain better contracts for selling recyclable materials with the higher volume of materials resulting from regional cooperation. In case of incineration, a regional facility is probably the only economically feasible approach. Regarding landfilling, regional cooperation can result in greater efficiency and cost savings in collecting and transferring waste and in operating the solid waste facility. Larger facilities are more attractive to private industry, which can relieve individual municipalities from the responsibilities of operating these facilities. The host municipalities can also claim additional cost savings.

### ***SOURCE REDUCTION***

Source reduction is an approach that changes the way products are manufactured, purchased, and used so that less solid waste is generated. You can ask local residents to generate less waste by:

- reusing plastic and paper shopping bags, lunch bags, and containers;
- eliminating unnecessary packaging;
- using long-life and energy-efficient products (such as light bulbs);
- avoiding disposable products if reusable items are available (such as razors and batteries).

Similarly, your municipal authority should consider revising its purchasing practices to follow the same principles listed above. Your community could also consider using “pay-as-you-throw” rates for garbage collection to reduce the amount of waste. However, charges should reflect community attitudes. At many locations where these systems were initiated without community support, illegal dumping of solid waste has increased.

### ***RECYCLING***

Some solid wastes can be collected separately and sold to manufacturers as raw materials for making products. Municipal leaders can tap into the desire among community members to “do the right thing” by designing programmes that make it easy to recycle. Recycling collection programmes range from simple, low-technology drop-off centers to complex separation at material recovery facilities.

Critical to the success of a recycling programme is the availability of markets for collected materials. Without proper markets, storing, transporting, and disposing of the recyclables that have been collected can result in significant costs. You will need to identify marketable materials and the potential volume of each and find potential buyers for the materials. In general, marketable recycling materials include:



- aluminium cans;
- other metal cans;
- glass bottles;
- some plastic bottles;
- high-grade office paper;
- newspaper and magazines;
- cardboard;
- metals;
- wet cell batteries (such as car batteries).

For the recycling process to go full circle, the recyclable materials that have been collected must actually be reused. Municipal authorities can help “close the loop” by purchasing products with recycled content and encouraging citizens and local industries to do the same; this helps create markets that ensure collected recyclables are reused.

Recycling alone will not solve a community’s solid waste problems, but it can divert a significant portion of the waste stream from disposal in landfills or combustion facilities.

### **COMPOSTING**

In the USA, green wastes (leaves, grass, weeds, and remains of plants) account for close to 20 percent (by volume) of the municipal solid waste stream. They can be easily decomposed by bacteria and fungi to form a humus-like product useful as a soil enhancer for gardening, landscaping, and agriculture. A centralised green areas waste composting programme can be relatively inexpensive and easy to operate, and can help reduce the amount of solid waste bound for disposal. You can encourage homeowners to compost garden waste on their property if a centralised system is not practical. Because home composting might attract unwanted animal life or breed insects if not done properly, a public education or assistance programme is important. In addition, community programmes that encourage the use of mulching mowers and low-maintenance plantings can be very effective in reducing the amount of yard waste generated.

### **SOLID WASTE COLLECTION AND TRANSFER**

Waste collection is often the most expensive element of the solid waste management operating costs (due to its labour and machinery intensity). Efficiency in the collection system can therefore save your municipality a significant amount of money. Collected solid wastes are delivered either to a transfer station or directly to disposal facilities. Transfer stations are centralised facilities where waste is unloaded from several small collection vehicles and loaded into a large vehicle; the large vehicle then transports waste to the disposal facility. In this way, only one vehicle

has to travel the last segment of the journey to the disposal facility. In addition, operation of a transfer station can be integrated with other waste management options such as recycling programmes. Due to high capital and operating costs, a careful cost-benefit analysis needs to be performed when evaluating the use of a transfer station.

### ***SOLID WASTE DISPOSAL***

The most common methods for solid waste disposal are landfilling and incineration. Landfilling involves placing wastes in a large, specially designed cavity, then covering them with soil (or approved alternative materials) each day. The daily cover prevents attraction of animals and insects.

Incineration involves burning combustible solid wastes (such as paper and plastic materials) in a large, specially designed furnace. The waste is reduced to an ash, which must then be disposed of, usually in a landfill. Incinerators can generate valuable energy as a by-product. Regional landfills and incineration facilities can provide practical and cost-effective regional solutions for several small communities. Capital and operating costs for these facilities can be shared by a larger number of users, reducing the cost to individuals in any one municipality.

### **7.2.4 TRANSPORT**

Transport solutions are traditionally not included in the environmental sector. However, because it has become an important environmental problem in many municipalities, it is prudent to include it in the strategy.

There are several ways to minimise the nuisance and pollution caused by transport, among them the following measures should be included:

- better organisation of traffic (see next section);
- increased role of public transportation;
- more extensive use of bicycles; and
- infrastructure.

### ***MORE EXTENSIVE USE OF NON-POLLUTING TRANSPORTATION MEANS***

In fact the only non-polluting means of transport is a bicycle. In smaller municipalities it is an easy, comfortable and efficient mode of transport. However, in many towns of Central and Eastern Europe the use of bicycles is still not very popular due to low environmental awareness and lack of proper infrastructure. A prerequisite to encourage inhabitants to use bicycles is a comfortable network of bicycle paths inside the town. It is recommended to accompany the creation of bicycle paths with some other measures such as:

- special parking places for safe parking of bicycles;
- events and campaigns promoting cycling;
- restrictive policy for car parking and admittance into the city center; and
- bicycles renting yards.

### **INCREASING THE ROLE OF PUBLIC TRANSPORTATION**

Public transportation does not have a sufficiently high reputation among the inhabitants of cities and towns, even if it is very beneficial for the environment compared to the use of private cars. Buses or trams are often unclean and old, their routes often do not satisfy all potential passengers, and the frequency is too low in certain locations. Those are the main obstacles for municipal authorities to encourage wider use of public transportation.

The first measure recommended to encourage the popularity of public transportation in a city is to analyse the needs of the inhabitants related to transportation and adapt routes, stops and time-tables accordingly. It is also advisable to synchronise the time-table of a municipal transportation system with a schedule of trains and buses coming from outside the municipality in order to facilitate travels for guests and visitors. Another measure which could be applied to increase attractiveness of public transportation is to give it traffic priority (e.g. a separate lane for buses).

Municipal authorities should also equip their fleet of buses with a more ecological fuel system (preferably gas or electricity or a hybrid system); this could be done gradually. Apart from the environmental benefits, it also improves the image of the municipality and could contribute to raising public awareness, and makes a good environmental practice.

### **INFRASTRUCTURE**

The soft measures described above should be accompanied with a relevant infrastructure development. One of the solutions used to separate transit and local traffic is the construction of a system of by-pass roads, which direct the transit traffic outside the town, and consequently reduce the number of cars passing the town centre and housing districts.

The construction of by-pass roads and diversion of traffic away from the city centre usually allows municipal authorities to close some parts of the town (e.g. old town, shopping area) to car and/or truck traffic and establish pedestrian zones. This measure usually requires the construction of parking places in areas from which it is convenient to walk to restricted parts of town. While planning the road infrastructure in a town, it is particularly important to correlate the works with land use plans and development plans in order to plan roads which will serve not only present but also future needs.

### **7.3 Types of Measures to be Considered: Soft Measures**

Municipal authorities often tend to think that investment measures can solve all the problems and because investments are usually expensive, they conclude that the major obstacle to solving most of the environmental problems is insufficient financial means. It is obvious that investments enable pollution reduction. However, there is a large number of soft, non-investment measures that are often more effective in addressing environmental problems. It should be remembered that by applying different types of measures (packaging of measures) problems can be solved faster, more efficiently and often with lower investment costs. Most important types of non-investment measures are briefly described below.

#### **7.3.1 EDUCATION AND COMMUNICATION MEASURES**

Public outreach programmes (e.g. organisation of public awareness campaigns, establishment of the information center, publication of a green consumer guide) are very important for the implementation of environmental strategies. Implementation depends to a high extent on the behaviour of companies, groups or just individual households. Therefore, environmental strategies should be developed with public participation, and this participation should not stop when a strategic document is ready. It should be continued not only to ensure the monitoring of the implementation but also for the effective execution of certain tasks (such as selective collection of municipal waste or reduction of water consumption), which need the commitment of individual inhabitants.

Training should also be applied to improve the expertise of local authorities, non-governmental organisations and other institutions on how to effectively implement environmental programmes or operate new facilities.

#### **7.3.2 ECONOMIC INCENTIVE MEASURES**

Among economic actions which could be carried out at the municipal level are mainly the incentives which promote environment-friendly behaviour and sound environmental performance by increasing the costs of continuing pollution or waste generation (e.g. introduction of a fee system based on the actual water consumption for households with meters, lower collection fee for separated waste, or introduction of the full cost recovery principle to all environmental services). Price differentiation can be introduced to stimulate environmentally desirable behaviour (this applies especially to waste management). The economic incentive rather than dictate the actions of individuals and companies allows them to find the most efficient means to reduce pollution.

#### **7.3.3 LEGAL AND ENFORCEMENT MEASURES**

In general, legal standards as well as regulations in most countries are at the discretion of national or regional authorities. This standard instrument is limited at the municipal level to local regulations concerning order and cleanliness, which is particularly relevant to waste management (littering, illegal dumpsites, devastation

of individual and communal containers), discharge of wastewater to stormwater mains, conditions and emptying of septic tanks, smell and noise nuisances etc. At a local level, the enforcement of regulations and use of legal instruments set by higher administration levels are more relevant tasks.

Among some of the most important legal regulations introduced at a local level are the municipal spatial plans assigning areas for different types of land-use (such as industrial areas, housing estates, commercial areas, parks and protection zones, transportation routes), depending on the town needs and natural environment requirements. Those plans can incorporate certain environmental conditions. Setting a protection zone for a municipal drinking water intake or development restrictions in areas prone to groundwater contamination illustrate such conditions. However, it should be emphasised that restrictions and the imposed conditions should not be excessively restrictive to stimulate compliance.

Instruments for environmental regulation consist of discharge and emission standards, permits and licences or land and water use permits. They are essential for avoiding or reducing pollution of air, water and land. Regulations require both standards and an effective system of monitoring and enforcement. The latter usually falls within the responsibility of local authorities or environmental inspections (e.g. non-compliance fines, shutdown of a non-compliant enterprise).

#### **7.3.4 INSTITUTIONAL MEASURES**

The establishment of a separate environmental department in the municipal authority, and employment of additional staff in environmental services are some of the examples of organisational actions. It is not only important to prepare a sound and realistic MES but also to develop the capacity to implement it. The needs for institutional reform of an implementing agency or just expanding certain departments in the municipal authority should be analysed during the strategy preparation process, and effective management structure should be proposed.

#### **7.3.5 MANAGEMENT MEASURES**

Often environmental stress is caused by the inadequate location of infrastructure projects, a poorly designed traffic system, a limited number and bad location of green areas in the city. For instance, in relation to traffic management, a number of low cost, management type measures can be applied to improve traffic management without major infrastructure investment:

- synchronisation of traffic lights to avoid frequent breaks and starts in vehicle movements when pollution with exhaust gases is the highest;
- organisation of a system of one-way traffic in busy and narrow streets, which will contribute to the general flow of traffic;
- separation of transit traffic from the local one: in most cities, it is possible to do that by using existing infrastructure but it is often a temporary solution.

Improved management and protection of water resources is an effective pollution prevention measure, which can save clean-up investment costs. Such a measure usually includes:

- delineating the catchment area;
- identification of potential sources of contamination in the water protection area;
- setting conditions and/or restrictions related to land use in the area;
- managing the area to prevent contaminants from entering the water supply source; and
- reviewing the protection programme every year and developing a contingency plan for alternative water supplies if needed.

Improvement of environmental services and greater cost-effectiveness can be achieved by applying more efficient management. Review of contractual arrangements (e.g. competitive service contracts versus franchising contracts), introduction of competition, privatisation, performance linked assessment and monitoring, surveys measuring satisfaction with services can all be introduced or modified with a view to improve the quality of services and keep the costs under control. Improved management of the water protection zones can greatly contribute to better protection of the water quality. Municipalities may decide to set up an association to share costs and achieve greater economy of scale and save on investment and maintenance costs. Contract service companies can be hired to handle some or all aspects of operating and managing environmental services.

Activity 9 will help you generate a long list of potential measures to address a specific objective.

### **Activity 9**

#### **Development of a long list of measures for a given objective**

In small groups, select one of the specific objectives and brainstorm a list of potential measures. Prepare a checklist to make sure that all types of measures are considered:

- infrastructure investment;
- technology investment;
- local by-laws;
- enforcement;
- economic incentives and tariff policy;
- institutional reform;
- planning;
- management; and
- education and awareness raising.

Look for all possible alternative measures and try to identify links amongst them (e.g. separate collection of municipal waste usually requires education, economic incentives, additional collection vehicle and labour). Check which measures are mutually reinforcing and which might clash. Discuss whether the list of measures is likely to be effective to meet the objective.



## 7.4 Appraisal and Packaging of Measures

This step should be initiated by the stakeholders in a series of working group meetings. It requires an experienced facilitator and strong technical and economic input by experts. The stakeholders should first select appraisal criteria for the evaluation of measures. The list of criteria should be reviewed and scrutinised by the working group by applying them randomly to the long list of measures. Next, the long list of measures prepared in the previous step should be scrutinised by (internal and external) specialists applying the selected criteria. Finally, packages of measures for each objective should be developed and scrutinised by working groups and/or experts to make sure that they use synergies and are mutually reinforcing.



After generating the long list of measures, it is necessary to decide what criteria will be used to evaluate possible alternative measures. Subsequently, the proposed measures should be appraised using a common set of criteria to determine their feasibility and relative advantages. For instance, almost any solution will need to be technically and economically feasible, and need to comply with legal requirements. Several criteria that are typically applied to evaluate alternative solutions are listed below. It is not necessary to select all of them. It is recommended to choose between three to five criteria. Developing and selecting criteria should be a joint work of experts and the stakeholder group, who should finally accept it.

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.) This 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 list below includes some of the examples of criteria for selecting alternative measures.

*Compliance with national legislation:* Review of the proposed measures is needed to assess whether they comply with legal requirements, national targets etc. It would also be wise to check the requirements of the EU legislation, especially if they are not yet fully reflected in your national legislation. For this purpose, you might consider the use of the EU Compliance Audit (see Chapter 4.3).

*Risk reduction/prevention potential:* Risk reduction refers to the amount of risk posed by an environmental problem that will be reduced by implementing a proposed measure. Risk reduction presumes that an existing environmental problem poses risks. However, for some environmental strategies, it is the amount of risk prevented, as opposed to the amount of risk reduced, that is important to estimate in evaluating a proposed strategy. In terms of evaluating proposed strategies, risk reduction and risk prevention are equivalent.



*Suitability of technology:* There appear to be many choices of technologies that could be applied to meet your objectives. However, when examined more closely, from a scientific perspective there are actually few options available. The technical feasibility of a proposed alternative must be considered and evaluated. Effective “off-the-shelf” (commonly used) technologies may be readily available for some environmental problems, but may not exist or may be prohibitively expensive for other environmental problems. In some cases, technological “fixes” may not be satisfactory or even possible. For instance, it is far more effective technically and financially to prevent groundwater contamination than to remediate contaminated groundwater sources. It is important not to be carried away by magic technological solutions that report to “turn garbage into gold.”

*Cost and Cost-effectiveness Analysis.* In evaluating measures, it is important to consider both the cost and cost-effectiveness. The cost of a measure can be analysed in a number of ways. It might impose the cost of the strategy on the government, the private sector, and/or general public either in the form of taxes or substitution costs associated with behavioural changes. Cost effectiveness refers to the cost of implementing pollution reduction or prevention solutions relative to the amount of expected environmental improvement or pollution reduction. In looking at both cost and cost-effectiveness, it is important to determine a time-frame for calculating cost-effectiveness. For instance, in solid waste management, cost-effectiveness is well reflected by the lowest cost per tonne indicator calculated for alternative levels and quality of service. Cost-effectiveness may involve a high investment cost with a low operating cost, or a low investment cost and relatively higher operating cost (for more information about Cost-Effectiveness Analysis, see Appendix 4).

*Cost-Benefit Analysis:* This appraisal method requires that all costs and benefits associated with the proposed alternative solutions are calculated and discounted. Often the analysed alternatives 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 analysed period. 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 0. Financially viable projects/scenarios require that both the NPV and the IRR values are positive (above 0). However, in the MES, these values may be negative or close to 0. This is due to the non-monetary nature of many environmental benefits. The so called ‘external’ environmental costs and benefits may substantially alter the traditional cost-benefit analysis (in favour of environmental projects). However, monetising environmental costs and benefits is both complex and controversial. It includes the monetisation of the effects of environmental degradation on production, preventive expenditure, replacement costs, evaluation of impacts on human health, as well as monetisation of such non-user values as biodiversity or landscape. (for more information on Cost-Benefit Analysis, see Appendix 5).



*Environmental and social impacts assessment:* It is possible that legal, technological and unit cost appraisals would bring positive results but the proposed measures would have negative environmental and social impacts. It is therefore important to evaluate these impacts (it will be required anyway in the future at the project preparation phase). Environmental and social impact assessment focus at all possible (positive, negative, cumulative) impacts associated with the proposed project. They predict impact magnitude and significance, analyse alternatives and propose mitigation measures. It is useful to link the predictions to a ‘do nothing’ option representing environmental impacts of the present municipal system in the field of environment.

*Implementation capacity:* There may be some measures that are cost-effective and technically feasible but which cannot be easily or quickly implemented. Some may require a multi-year effort before results can be seen. For example, an education programme targeted toward schools may take a long time to show results if the goal is to permanently change the school curriculum. This does not mean that the solution should not be applied; rather it means that expectations should be realistic when making public commitments of this nature. It may also be advisable to combine some measures with longer time-frames before results can be reasonably expected.

*Environmental Equity:* Specific populations can be at a high environmental risk because they are systematically exposed to higher levels of harmful materials or because they are more susceptible to developing health effects (e.g. poor people with limited access to health care services). Environmental solutions can be designed to explicitly address equity concerns. This could be facilitated by analysing the risk burden on specific groups of residents during the problem evaluation stage (for more information see section 5.2.2). Currently, methods are being developed to improve our understanding of the sources, routes of exposure, and health effects on specific populations at higher risk, such as individuals in high occupational or neighbourhood risks.

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

#### **Recommendation:**

When identifying criteria for selecting alternative measures, conduct a discussion among the members of the stakeholder group that results in an agreed set of criteria. You could assign the weighting system to the criteria, if you think they have different importance levels.



Once the alternative measures are identified, the appraisal of pre-selected measures against the evaluation criteria (presented above) follows. The appraisal itself is usually undertaken by experts, but final comparison and selection of measures should be done by the stakeholder group. (An example of a simplified evaluation matrix is presented in Figure 12.) When alternative measures are appraised, the stakeholders should establish the most cost-effective and acceptable packages of measures complying with legal, technological, environmental and social requirements. A package of measures is a coherent mix of various tools (direct regulations, enforcement, incentive instruments, land use planning, capital investment, training and education) that uses synergies for achieving environmental objectives in a cost-effective manner and avoids policy conflicts (see Figure 12 for an illustration of a package of measures).

<p>Objective: Eliminate illegal dumping and recultivate existing illegal dumpsites</p> <p><b>Package of measures:</b></p> <ul style="list-style-type: none"> <li>▪ Revise <b>local by-laws</b> to introduce stronger prohibitive sanctions for illegal dumping violators.</li> <li>▪ Strengthen <b>enforcement</b> by setting up eco-police or increasing patrolling by municipal police in areas particularly prone to illegal dumping, sending warning notices to suspected violators, and/or inspect waste collection contracts in family houses areas.</li> <li>▪ Send cleaning-up notices to private land owners if illegal dumpsites are located within their land, and offer assistance if required.</li> <li>▪ Introduce free mobile collection of bulky waste twice a year (provision of municipal <b>subsidy</b> to contractor).</li> <li>▪ Change the <b>pricing policy</b> for waste collection. If separate collection is not introduced on a wider scale, a flat fee rate may be considered as disincentive for illegal dumping.</li> <li>▪ Run an <b>awareness raising</b> campaign amongst local population: leaflets, lectures at schools, local press and radio coverage explaining the damaging impacts of illegal dumping.</li> <li>▪ Provide <b>information</b>: install of sign posts banning illegal dumping in areas where illegal dumping occurs frequently.</li> <li>▪ <b>Monitoring and reporting</b>: prepare and regularly update an inventory of all illegal dumping sites.</li> <li>▪ Prepare a <b>municipal programme</b> for the recultivation of illegal dumpsites, which specifies the technology and timetable, as well as costs and funding sources.</li> <li>▪ <b>Capital investment</b>: recultivate all illegal dumpsites using cost-effective methods that allows to return the sites to their original use.</li> </ul>
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Figure 12. Illustration of a package of measures

A *package of measures* helps develop environmentally effective, administratively efficient, and targeted programmes to pursue SMART objectives and address priority problems. While building packages of measures it should be kept in mind that a combination of measures for some problems/tasks could be used. Different measures can complement each other or be used to handle different aspects of a problem. For example, a community experiencing problems with septic tank systems might develop a combination of on-site, cluster, and centralised systems for

treating wastewater, along with a community-wide water conservation programme to improve the performance of all of them. A central treatment plant can be built to serve residences and businesses in more densely settled areas of the community, while cluster systems can serve outlying homes for which on-site systems are not suitable.

The draft *package of measures* needs to be finally appraised to check whether:

- the package is sufficient to achieve the specific objective;
- What local legislation should be introduced or amended?
- What would be the cost for the city budget?
- What would be the cost for consumers?
- What would be the cost for the utility companies, and local businesses, and how would it affect competitiveness?
- the package has the best benefit to cost ratio?

Usually, the decisive role in the selection, appraisal and packaging of measures is played by the financial appraisal (NPV, IRR and unit cost per tonne, as in relation to solid waste management). However, in a situation where the unit costs per tonne of the appraised scenarios are very similar, the additional appraisal methods may decide on the selection of scenario. This stage of the packaging of measures should be iterative in that a rough estimation of potential costs should be taken into account. If costs seem excessive and unaffordable for the city, the measures, and consequently, the objective which they support should be downgraded and set at an affordable level so long as the proposed systems provide minimum environmental and safety measures that meet local regulatory requirements.

Activity 10 will help you to practice develop an effective package of measures.



### Activity 10

#### Development of a package of measures addressing waste management objective

The city of Rubishevo has a population of 100,000. The industry, businesses and commerce contribute 30% to the municipal waste generation of the city. About 45% of the population live in family houses. The waste management practice was confined to the collection of mixed waste and depositing it in the municipal landfill site located in the neighbouring municipality of Dumpevo. The landfill space has been quickly filling up – the remaining life span is estimated to be 5-6 years. The landfill does not fully comply with the requirements of the EU Landfill Directive (recently adopted in the national legislation). Separate collection in the city is confined to 15 bring-site containers (igloo) for white and colour glass, paper and textiles. The system was not integrated with the provision of education and information to the local population. The contamination of collected materials is high (+20%) – people often drop paper to textiles, and mix white and colour glass. In addition, several bring-site containers were devastated in the recent years and scrapped. The waste management in the city is run by a municipal waste management company. No competition in the market has been introduced. Currently, the population pays a flat charge for waste collection (irrespective of volume). The charge covers all operating and capital costs of waste management (the latter has been very low in the recent years). The collection charge in Rubishevo is currently at the level of 0.4% of the average household income.

To address the waste disposal crisis, Rubishevo is developing a Solid Waste Management Strategy covering the period 2003–2013. The preliminary key recommendation of the strategy is to extend the lifetime of the existing landfill site in order to gain time to prepare a project and find funding for a new municipal landfill site. Currently, the city needs to prepare an integrated *package of measures* to achieve the following objective:

*Extend the life-time of the existing municipal landfill site from 5-6 years to 8 years by minimising the waste deposition through separate collection at source, in the neighbourhood and by home composting. Prevent the devastation of igloo containers and reduce the contamination of collected materials.*

Your task:

- Develop a consistent and effective package of measures addressing the above objective.
- The package should consist of at least 8 different measures.
- Try to formulate the measures in a specific manner (providing figures whenever possible) and explain their operation.
- Identify and demonstrate the most important synergies and links amongst the measures (i.e. measures that are unlikely to be effective without the introduction of other measures).
- Identify environmental and social impacts of the package of measures.
- Propose appraisal methods to evaluate the cost-effectiveness of the proposed package.

## 8. How to Make it Happen? Final Phase

This chapter provides guidance for the concluding phase of the strategic planning process focusing on the drafting of the financial plan and putting together the MES document and the action plan. The responsibility for the final phase lies with the project coordinator, external experts and the stakeholder group. If the stakeholder process is applied and the methodological steps followed, the official approval process of the MES should be relatively straightforward.

### 8.1 Drafting of the Financial Plan

Drafting the financial plan is normally undertaken by internal or external experts in cooperation with the stakeholder working groups. The draft financial plan should be sent out to the stakeholders for consultation.



A realistic financial plan is vitally important for the successful implementation of any strategy. Whilst the economic assessment of the strategy estimates costs and adjusts the objectives and measures to the overall financial means (to make sure that the strategy is affordable), the financial plan stipulates specific funding sources for each element of the strategy in a given period of time. Usually, an indicative financial plan is prepared for the whole duration of the strategy (i.e. 12 years), and a more detailed multiyear financial plan is prepared for the short-term horizon (e.g. four years). It is a good practice to integrate the short-term financial plan with the multiyear budget plan of the city.

The results of the economic assessment, i.e. costs, benefits, NPV and IRR indicators, should be used to prepare the financial plan. Essentially, the financial plan is a financial package that addresses all financial needs of the Strategy, aims to close all financial gaps and stipulates funding sources and matching funding.

The difficult part in preparing the financial plan is to decide on the share of the city budget financial involvement, cost recovery from the service charges, loan taking, involvement of the private sector, and foreign assistance (of which the EU funding is the most important part for the CEE region). It is useful to start with assessing the financial situation of your city. To check the financial situation and evaluate future funding prospects from the city budget, 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 the current and future financial standing. These may include changes in tax legislation, migration trends in the local community and industrial 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 (including increased user charges and any other revenues that the Strategy might generate).

The difficulty which the cities in the CEE region face in terms of financial planning is the uncertainty concerning the allocation of EU assistance funding. The EU accession process involves very large financial resources available for environmental infrastructure projects channelled through the ISPA, PHARE, ERDF, TACIS and other programmes. However, the rule in most EU pre-accession programmes is that the EU covers up to 75% of funds and the rest has to be provided by the beneficiary (this sum may include the provision of land). Applying for EU funds is obviously a time-consuming process and there is no certainty that the funds will be allocated until the funding memorandum is signed. This creates difficulties in the financial planning for the strategy and for the city budget itself. These uncertainties cannot be completely avoided. However, they can be reduced by approaching the ISPA or PHARE contracting authorities as early as possible (during the strategy formulation) to find out whether the specific project is eligible for EU funding and what are the funding prospects for the near future. It is also useful if the project in question responds to the national priorities included in the National Plan for Adoption of Acquis (annual programmes prepared by the CEE countries where the investment priorities are stipulated). In any case it is not a good practice to indicate in the financial plan the EU funding for most infrastructure projects have no certainty that the funding will indeed be provided. If the application fails, the financing package becomes unrealistic and the strategy becomes partly not implementable.

The final part of preparing the financial plan is to divide the pool of available resources to allocate them to the specific measures. If the financial resources do not match some specific financial needs, the following measures can be taken:

- raising revenues by, for example, gradually increasing user charges for environmental services;
- taking out commercial loans (national sources or IFIs), 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;
- consider EU assistance funding or other funding sources;
- negotiate involvement of the private sector.

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



When the analytical work is completed, the financial plan can be put together and 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 that lists all objectives and actions along with funding sources (see Figure 13). The financial plan should demonstrate the funding status of each objective and measure in percentages of funding secured and funding sought (if any).



Financing sources [million x]									Total available [million x]*	Total cost [million x]	% secured funds
Public								Private			
	City's budget	Revenue stream	Govern- ment subsidy	EU funding		Environ- mental Fund	Loans	Private sector			
				ISPA	PHARE						
Objective 1											
Measure 1.1	10			30	0	0	10	0	50	60	83.3
Measure 1.2											
Measure 1.3											
Objective 2											
Measure 2.1											
Measure 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 13. Illustrative matrix for four-year Indicative Financing Plan

## 8.2 Drafting a Long-Term Strategy Document and Short-Term Action Plan

Drafting the strategy and the action plan documents is normally undertaken by the coordination unit with active involvement and supervision of (internal or external) experts. The interested stakeholders should be invited to draft specific parts of the plan or work alongside the experts. The draft Strategy and Action Plan documents should be sent out for consultation to the stakeholders invited to the process. The 6<sup>th</sup> SGM should be convened to discuss and amend the draft document.



The Strategy and the Action Plan combine the results of all methodological steps discussed in the earlier sections of this Guidebook. It should be written clearly and focus on the most important findings. The use of tables and graphs is usually very helpful in summarising the results. The strategy document is often prepared for a long-term horizon of at least 12 years. The document should contain:

- executive summary;
- objectives of the strategy, and its vision statement, time horizon and geographical coverage of the strategy;
- brief description of the methodology applied in the development of the strategy;
- description of the baseline environmental conditions in the city;
- list of problems pointing out priority problems;
- list of priority objectives;
- description of identified and selected measures;
- financial Plan.

The MES document should be presented in a structured way, including the descriptive information as well as figures, tables, matrices and graphs. The document should contain an executive summary presented in a non-specialist language for general public dissemination. The Environmental Status Report (see section 4.3) should be utilised for the description of the current status of environment and environmental services. The full text of the Environmental Status Report can be appended to the MES, as can be results of other key studies, analyses and documents. The content of the MES should be user-friendly for the implementation agencies.

The final output of the strategic planning process in terms of preparation of documents is the short-term action plan. It may be either integrated with the strategy document or form a separate document. The environmental action plan is usually prepared for four years. It is presented as a matrix listing all project objectives and measures against:

- implementation responsibility;
- time-frames;
- costs (investment, operational, soft projects);
- funding sources;
- funding status of each measure (e.g. secured, sought, targeted);
- clustered actions (i.e. actions that depend on the implementation of other actions);
- human resources requirements;
- performance monitoring criteria (assuming this includes environmental indicators) etc.

The document should be concise and to-the-point (see Figure 14 for an illustration of an action plan matrix applied in the city of Chelm, Poland; note that the matrix does not include funding source, funding status of measures, clustered actions and performance monitoring criteria).



Strategic Objective	Specific Objective	Tasks	Responsible*	When	Cost (1999 prices) 1 USD = 4 PLN
1. Protection of underground water from contamination and counteracting the effects of contamination	1.1 Directing all sewage to sewers and treatment	1.1.1 Executing the sewer system extension programme (for the town's current and future requirements)	BIM, MPKG, GFOŚiGW	1999-2010	1.9-2.1m PLN
		1.1.2 Creating a system of incentives for mobilising individuals to connect to the sewer system	GFOŚiGW, MPKG, ZM, WF, WGMK	1999-2010	150,000 PLN
		1.1.3 Effective execution of the law	WOŚ, SM, MPKG, UM lawyers, WGKL	1999 - running task	10,000 PLN
		1.1.4 A programme for increasing the inhabitants' awareness of threats caused by pollution getting into the soil and underground water from leaking cesspits	WOŚ, MPKG, LAŚ	1999 - running task	35,000 PLN
	1.2 Liquidation of area pollution sources	1.2.1 Proper management of ground used agriculturally and for similar purposes within the town limits	WOŚ, SM, WGPA, land owners, LAŚ	1999 - running task	40,000 PLN
		1.2.2 Reducing the threat caused by rainfall infiltrating into the ground from areas without sewers or drains	WOŚ, MPKG, SM, BIM, LAŚ, Police, IOŚ, land owners and administrators	1999 - running task	50-60,000 PLN
	1.3 Consistent protection of water resources particularly in sensitive areas	1.3.1 Identification of particularly sensitive zones and defining the conditions for commercial operations in these areas	WOŚ, MPKG, WGKL, WGPA, sanitary services, organisation units, IOŚ	1999 – running task	400,000 PLN
		1.3.2 Drawing up and launching a system of imposing and controlling the implementation of conditions safeguarding land from contamination for new investments	WOŚ, WGPA, sanitary services, IOŚ	1999 – running task	Running costs
	1.4 Limiting the spread of contamination	1.4.1 Appropriate exploitation of the "Bariera" intake	WOŚ, MPKG, cement works, IOŚ, sanitary services, MPKG	1999 – running task	Running costs
		1.4.2 Recultivation of the cement works dump	WOŚ, ZM	1999 – 2005	Running costs
	1.5 Ensuring appropriate quality drinking water for the town's inhabitants	1.5.1 Preparation of an alternative water supply system for the town independent of the Cement-works (the Garka and Bariera Bis intakes)	BIM, WOŚ, MPKG, WGMK, GFOŚiGW, WFOŚiGW	1999 – 2000	0.2 m.PLN doc. 1.5-6m PLN execution
		1.6 Limiting the irremediable usage of local water resources	WOŚ, cement works	2003 – 2010	Running costs

Source: Chelm Municipality, the National Foundation for Environmental Protection (1999).

\*Abbreviations applied in this figure are explained in Appendix 1, section 4.3.

Figure 14. Selected extract of the Environmental Action Plan (Chelm, Poland).

## 9. How to Make it Work? Implementation, Progress Monitoring and Evaluation

This chapter addresses the implementation phase of the MES. The first section describes institutionalisation of the MES and it describes how the project implementation plans can be prepared. The second section describes the Logical Framework Analysis as a useful tool for project preparation. The final sections present the approach to monitoring MES progress as well as updates and revision arrangements.

### 9.1 Institutional and Management Arrangements

The strategic planning process does not end when the MES document is completed and officially approved. The implementation, monitoring and evaluation stages follow the strategy preparation phase and eventually lead to cyclic revision of the strategy. This chapter is aimed at guiding you through this process. It will also describe a useful tool that may be applied to link the MES and the Action Plan with project development.

The coordination unit completes the MES documents and submits them for adoption to the city council. Progress monitoring criteria should be developed during the 7<sup>th</sup> SGM where the final MES document is presented (this usually requires some degree of expert input). The coordination unit normally takes the leading role in implementing the MES, coordination of project preparation, linking the MES to multiyear investment plans, monitoring progress and dissemination of results; and thus should continue its operation. Independent progress evaluation should be undertaken at regular intervals (e.g. once a year). You may like to consider supervision at an interval of at least six months or more frequently. 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 and reviewed by the stakeholders, the strategy needs to be institutionalised. The institutionalisation involves adoption by the city council and introducing management arrangements required to ensure successful implementation. These management arrangements usually include:

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

The implementation phase will usually start with project preparation, feasibility studies and the drafting of terms of reference. For infrastructure projects, project preparation is extensive and involves, inter alia, detailed project designs and bills of quantities, advertising bid documents, tendering and contracting, and supervision of construction. A useful management tool for the strategy implementation are project implementation plans drafted for each activity included in the strategy. The project implementation plan clearly describes project objectives, task manager and executing team, project description, outputs and indicators of achievement (see Figure 15). The key part of the plan is a detailed list of all actions that need to be taken to implement the project and of all inputs against execution responsibilities, costs and human resources requirements. The project implementation plan should be formally approved by the delegated manager. Such a plan (see Figure 15) should contain at least the following sections:

- a detailed description of the task, including a definition of hierarchy and action priorities;
- the steps which need to be taken for the task to be executed;
- an indication of the institutions/people responsible for carrying out each step;
- a definition or at least an estimation of the execution costs for the steps determined;
- sources of finance;
- suggested execution deadlines;
- indicators to ensure proper monitoring of the execution of the task and further steps.

<b>City of Chelm</b> <b>Project number:</b> <b>GOAL :</b> Protection of ground water against pollution <b>OBJECTIVE:</b> Channelling of all waste water to a wastewater sewer system and/or treatment		<b>Project Implementation Plan</b> <b>for</b> <b>Municipal Environmental Strategy</b> <b>Programme Task Manager:</b> Abeca Defga <b>Executing Team:</b> Jan Kowalski Malgosia Mazurek Jozef Kaleta		
<b>Project Description:</b> The City of Chelm has a modern sewage treatment plant which works below its capacity because less than 80% of inhabitants are connected to the sewerage system. The project aims at the extension of the sewerage system to cover all households and businesses. The first stage of the project deals with the development of a management plan, feasibility studies and project preparation. The second stage includes the construction of the sewers.				
<b>Project Output:</b> <ul style="list-style-type: none"> <li>Discharge of 100% generated wastewater to the sewer system, and channelling to the wastewater treatment plant;</li> <li>Elimination of deficiencies in the wastewater management system;</li> <li>Improved sanitation of the urban areas of the town;</li> <li>Facilitation of the economic development of the city in accordance with environmental requirements.</li> </ul>				
<b>Indicators of achievement:</b> <ul style="list-style-type: none"> <li>100% of wastewater is collected in sewers.</li> <li>100% of wastewater is treated.</li> <li>All investment projects are completed in 2010.</li> </ul>				
<b>Project Inputs:</b>				
<b>1. Implementation of waste water management plan (for present and future needs)</b>	<b>Responsible institutions</b>	<b>Supervision &amp; cooperation</b>	<b>Deadlines</b>	<b>Cost [PLN]</b>
1.1 Verification/revision of the existing wastewater management plan regarding sewers construction	WSP, WGPA, MPGK	ZM	1999	Operational costs
1.2. Development of the financial plan for the extension of the sewers and allocation of the resources for its implementation	WSP, WGPA, GFOŚiGW	RM	2000	Operational costs
1.3. Preparation of a detailed programme and a feasibility study for the Old Town area	WSP, WGPA, MPGK	SOZ	2000	20 000 PLN
1.4. Preparation of the financial analysis for the sewer extension into rural areas adjacent to the town	WSP, WGPA,	WOŚ, neighbouring communities	2002	50 000 PLN
1.5. Implementation of the revised and detailed plan	MPGK	WOŚ, neighbouring communities	2010	2 000 000 PLN
<b>Comments:</b> It is necessary to update the information on the progress in the implementation of the "Wastewater Management Plan" regarding sewer construction, prepared in 1997 by the Central Mining Institute. In particular, the plan provides for: <ul style="list-style-type: none"> <li>the inclusion of almost 100% of existing houses, except the houses at Wschodnia Street, where it is not economically viable to extend the sewer system;</li> <li>the provision of infrastructure for the areas designated for housing purposes.</li> </ul> For the sake of successful implementation it will be necessary to modernise the pumping station and increase the capacity of some sections of the wastewater system. Given the high remaining capacity of the municipal wastewater treatment it is advisable to connect other rural areas close to the town.				
<b>Project Estimated Budget: 2.070 mln PLN</b>				
<b>Approval:</b> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 30%; text-align: center;"> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/>       Date     </div> <div style="width: 30%; text-align: center;"> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/>       Team Leader's Signature     </div> <div style="width: 30%; text-align: center;"> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/>       Manager's Signature     </div> </div>				

Source: Chelm Municipality, the National Foundation for Environmental Protection (1999)

Figure 15. Illustration of a project implementation plan template applied in Chelm, Poland (modified)

## 9.2 Logical Framework Analysis

A useful tool, which can be applied to link the MES and the Action Plan with project formulation and preparation is the *Logical Framework Analysis (LogFrame)*. The LogFrame methodology helps in focusing on:

- how the nature of the problem and the overall objective give rise to the *intervention measures* that you plan and the immediate objectives for each of those intervention measures;
- the inputs and outputs for each intervention measure;
- the outputs that indicate whether the objectives have been achieved;
- the assumptions that you make in assuming that the achievement of your objectives may be reasonably possible; and
- the risks indicating when your objectives may not be achieved due to factors beyond your control.

The preparation of a LogFrame allows a structured consideration of the project concept and its presentation in an easy-to-follow-and-review matrix. The matrix consists of four columns: strategy column (presents the vertical logic of the project: overall objective, specific objective, outputs and inputs), indicators of achievement, means of verification, and assumptions and risks (see Figure 16).

The LogFrame should be developed in a *top-down* manner, that is the indicators, means of verification, and the assumption and risks columns should be developed first for the overall objectives, then for the specific objectives, outputs and finally for the inputs. The consistency of the LogFrame matrix can be checked in a *bottom-up* reasoning: the inputs should deliver the outputs, which in turn should deliver specific objective, which in turn should contribute to the implementation of the overall objective.

The LogFrame should be the first point of reference for the MES implementation agencies. It will enable organisations to focus their activities on the delivery of outputs. It also helps to identify the assumptions and risks associated with particular projects.

Strategy	Indicators	Means of verification	Assumptions & risks
<b>Overall objective</b> of the planned intervention	<ul style="list-style-type: none"> <li>What quantity or quantities will you measure in order to determine whether or not the overall objective has been achieved?</li> </ul>	<ul style="list-style-type: none"> <li>What logical test will you apply to the indicators in order to be able to answer “yes” or “no” to the question: “Has the overall objective been achieved?”</li> </ul>	<ul style="list-style-type: none"> <li>What are you assuming in planning to achieve this objective?</li> <li>What are the risks that may compromise your ability to achieve this objective?</li> <li>What can happen to invalidate your assumptions?</li> </ul>
<b>Subsidiary objectives</b> of the planned intervention	<ul style="list-style-type: none"> <li>What quantity or quantities will you measure in order to determine whether or not the subsidiary objectives have been achieved?</li> </ul>	<ul style="list-style-type: none"> <li>What logical tests will you apply to the indicators in order to be able to answer “yes” or “no” to the question: “Have the subsidiary objectives been achieved?”</li> </ul>	<ul style="list-style-type: none"> <li>What are you assuming in planning to achieve these objectives?</li> <li>What are the risks that may compromise your ability to achieve these objectives?</li> <li>What can happen to invalidate your assumptions?</li> </ul>
<b>Outputs / results and activities</b>	<ul style="list-style-type: none"> <li>What quantity or quantities will you measure in order to determine whether or not the planned outputs / results have been delivered?</li> <li>What quantity or quantities will you measure in order to determine whether or not the planned activities have been carried out?</li> </ul>	<ul style="list-style-type: none"> <li>What logical tests will you apply to the indicators in order to be able to answer “yes” or “no” to the question: “Have the planned outputs / results been delivered and the planned activities carried out?”</li> </ul>	<ul style="list-style-type: none"> <li>What are you assuming in planning to deliver these outputs / results and undertake these activities?</li> <li>What are the risks that may compromise your ability to deliver these outputs / results and undertake these activities?</li> <li>What can happen to invalidate your assumptions?</li> </ul>
<b>Inputs</b>	<ul style="list-style-type: none"> <li>What quantity or quantities will you measure in order to determine whether or not the planned inputs have been provided?</li> </ul>	<ul style="list-style-type: none"> <li>What logical tests will you apply to the indicators in order to be able to answer “yes” or “no” to the question: “Have the planned inputs been provided?”</li> </ul>	<ul style="list-style-type: none"> <li>What are you assuming in planning to procure and provide these inputs?</li> <li>What are the risks that may compromise your ability to procure and provide these inputs?</li> <li>What can happen to invalidate your assumptions?</li> </ul>

Figure 16: Structure and content of the Logframe matrix

### 9.3 Progress Monitoring

The strategy implementation phase is integrated with *progress monitoring* arrangements that are based on a well-defined and measurable set of progress monitoring criteria (the monitoring criteria can be developed in the LogFrame matrix). Monitoring criteria can include management criteria, financial and physical or environmental criteria. Examples of progress monitoring criteria include:

- the timing—is the action implemented according to the time schedule?;
- the actual expenditure compared with the expenditure expected in the financial plan;
- the level of operational costs against the projections made in the strategy;
- meeting the targets stipulated in the strategy (e.g. achieving agreed quality of drinking water, raising water quality in a river from class 3 to class 2, achieving volumes of separate waste collection etc.);
- the involvement of the private sector and increase in private sector investment;
- citizen participation in the implementation of projects;
- the enforcement of user charges (e.g. percentage of households paying user charges);
- the volume of recycled materials (and their proportion to total waste generated);
- the number of illegal dumpsites cleaned up;
- the estimated number of citizens reached by awareness campaigns, and the corresponding increase in satisfaction with service improvements and user charges; and
- 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 municipal authorities and the stakeholders for comments before a stakeholder meeting is convened. The stakeholders should be given the opportunity to comment actively on the implementation. Annual stakeholder meetings provide a good platform for reviews.

Activity 11 will help you design progress monitoring criteria for your MES.



**Activity 11****Developing criteria for monitoring the progress of the Municipal Environmental Strategy****Step 1**

Select three alternative objectives: e.g. design and construction of a sanitary landfill, extension of the sewerage system to x part of your city, diverting traffic away from the city centre.

**Step 2**

Make a list of measures 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 the progress for each specific objective and action.

**Step 3**

What differences do you see between

- the progress monitoring criteria developed for the three different objectives?
- the progress monitoring criteria developed for objectives and for actions?

**9.4 Updates and Revisions**

The implementation of the strategy will inevitably face difficulties, stumbling blocks and opposition. Typically, the common risks to successful implementation include (Leitmann, 1999):

- unfeasible or ineffective measures included in the action plans;
- public opposition to certain aspects of the planning process, particularly the location of controversial facilities (the NIMBY syndrome);
- political opposition in case of new politicians coming to power during the strategy implementation;
- bureaucratic opposition in case of certain institution/s, which may fear that they lose influence.

Means of minimising these risks (Leitmann, 1999) include strong stakeholder participation, regular dissemination of information, involvement of the opposition politicians, formal agreements with implementing institutions, focus on feasible cost-effective solutions, and regular updates of the MES to keep it up-to-date.

Experience with the strategy implementation builds over time and allows updates and revisions to be made. It is a *good practice* to make 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 substantive 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 (e.g. due to new and/or worsening environmental problems, and/or from new legislation).
- The implementation option/s set in the strategy need/s 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.

## 10. Concluding Remarks

Ambitious environmental standards (such as those required by the EU) and high quality urban environment are costly. Good quality drinking water, clean rivers and lakes, good ambient air quality, low noise emissions, the provision of a sewerage system to all houses, or high quality amenity sites require expensive investments and effective management. Strategic planning offers a useful tool for making cost-effective solutions. It is also required as a precondition for applying for international funding assistance.

A sound strategy document is important in itself. Equally important are the process leading to its development, and the implementation phase. Managing the Municipal Environmental Strategy process is complex. Figure 17 summarises the key outputs and inputs of the MES preparation discussed in previous chapters, and presents them in timeframes (compare with Figure 1). As shown, the process of the strategy preparation and institutionalisation usually takes about 15 months. The process requires multiple inputs by the coordination unit and city administration, stakeholders, external and internal experts, and politicians. At least seven one-day stakeholder group meetings are usually required, as well as a number of specialist working group meetings and specialist meetings. The outputs of the MES development process include a number of reports including the Environmental Status Report, an environmental risk assessment, economic and financial appraisals, a cost-benefit analysis, a financial plan, the strategy document and action plan, project implementation plans etc. Implementation of the MES requires further sustaining the effort of the city administration and the stakeholders. Usually, several MES cycles are required before good quality environmental conditions and services are achieved.

It is crucial that strategic planning for municipal environmental management is undertaken in a stakeholder participatory approach. Clear 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 a consensus for public action. 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 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.

This Guidebook explains that expert input has to go hand-in-hand with the participatory stakeholder process. In fact, a number of methodological steps for making the MES should be undertaken primarily by experts or those with strong specialist input. Such analyses-intensive steps include a comparative risk assessment, the identification of alternative packages of measures and their appraisal, an economic assessment, the preparation of a financial plan. The proof of a successful strategic planning process becomes evident when the MES document largely satisfies both the experts and the stakeholders.

Methodological step	Co-ordination unit	Stakeholder group	Technical experts	Official meetings	Time-frames
Setting up the project	Setting up organisation structure; securing political support; preparing methodology and drafting reports; securing logistical support	None	Proposing organisation structure of the project; preparing methodology	None	Month 1
Setting the stakeholder process	Identifying stakeholders; seeking official approval of stakeholder group; inviting stakeholders to 1 <sup>st</sup> Stakeholder Group Meeting (SGM)	Participation in 1 <sup>st</sup> SGM	Facilitation of 1 <sup>st</sup> SGM	1 <sup>st</sup> SGM: launching the MES process; presenting methodology	Month 2
Collecting data	Identifying data gaps; collecting and analysing missing data; reviewing related sectoral plans and strategies	Assistance in data collection	Assistance in data collection and analyses if needed	None	Month 1 to 3 (depends on data coverage))
Drafting Environmental Status Report (ESR)	Drafting status report	Report review	Technical and methodological input to drafting the ESR	2 <sup>nd</sup> SGM: review of the ESR; identification and ranking of environmental problems	Month 3
Identifying and ranking environmental problems	Organising 2 <sup>nd</sup> SGM; dissemination of results	Participation in 2 <sup>nd</sup> SGM, problem identification, analysis and ranking	Facilitation of 2 <sup>nd</sup> SGM; providing expert advice		Month 4
Setting community vision and specific objectives	Organising 3 <sup>rd</sup> SGM; dissemination of meeting results	Participation in 3 <sup>rd</sup> SGM; setting community vision & specific objectives	Facilitation of 3 <sup>rd</sup> SGM; providing expert advice	3 <sup>rd</sup> SGM: community vision and objectives	Month 5
Developing objective tree and ranking objectives	Organising 4 <sup>th</sup> SGM; dissemination of materials and meeting results	Participation in 4 <sup>th</sup> SGM; setting objective tree and ranking objectives	Facilitation of 4 <sup>th</sup> SGM; technical input to objective tree and ranking	4 <sup>th</sup> SGM: objective tree and ranking of objectives	Month 6
Identification and packaging of measures addressing priority objectives	Organising 5 <sup>th</sup> SGM; input to packaging of measures; compilation of results; setting up working groups(WG)	Participation in 5 <sup>th</sup> SGM; proposing long list of measures and packages of measures for each objective	Facilitation of 5 <sup>th</sup> SGM; providing alternative measures; input to packaging of measures	5 <sup>th</sup> SGM: long list of measures, WGs meetings to package measures	Month 7
Economic and technical appraisal of measures	Co-ordination of the appraisal process; revision of objectives	Providing input and insight into the appraisal process	Undertaking technical and economic appraisal	WG meetings with experts to appraise measures	Months 8-9
Drafting financial plan	Co-ordination of financial plan drafting; liaison with stakeholders	WGs assist in data collection and analyses for the financial plan	Financial analysis and drafting financial plan	WGM with experts to assist in financial appraisal	Months 10-11
Drafting long-term MES and short-term action plan	Drafting the MES document and action plan; preparing 6 <sup>th</sup> SGM; dissemination and handling comments	Participation in 6 <sup>th</sup> SGM; review of the MES document and action plan	Input to drafting the MES document and the action plan; facilitation of 6 <sup>th</sup> SGM	6 <sup>th</sup> SGM: review and discussion on the MES document and action plan	Months 11-13
Institutionalisation of the MES and setting progress monitoring criteria	Finalisation of MES documents, submission to city council, setting performance monitoring criteria; organising 7 <sup>th</sup> SGM	Participation in 7 <sup>th</sup> SGM; input to setting up progress monitoring criteria and implementation tools	Facilitation of 7 <sup>th</sup> SGM, input to development of progress monitoring criteria and implementation tools	7 <sup>th</sup> SGM: discussion on the final results; proposing progress monitoring criteria	Months 14-15
Implementation, monitoring and verification	Project preparation, project implementation plans, monitoring progress; convening annual SGM	Participation in monitoring, implementation, and revision of the MES	Input to project preparation and implementation plans, linking the MES to Multiyear Investment Plan	Annual SGMs, review of progress and updating the MES	Months 15

Figure 17. Illustration of the inputs, responsibilities and timeframes applied in the Municipal Environmental Strategy preparation

Much effort should be put in the early preparatory stages of the MES to make sure that the methodology is approved and agreed, ensure sufficient coverage of data, set up an effective organisational structure for the MES development and implementation, organise the stakeholder process, to identify and review relevant sectoral strategies and programmes, and secure political support and interest of the city council, politicians, industry and businesses. Failure in properly addressing the early stages of the MES is likely to derail the MES process and compromise the quality and implementation prospects of the strategy.

Prioritisation of environmental problems and objectives is crucially important to build effective MES and ensure appropriate allocation of often scarce resources. The selection of ranking methods should be adjusted to local conditions and capacity. The key element in building an effective and implementable MES is the packaging of measures (both hard investment and a range of soft measures) to achieve synergies in addressing objectives, as well as the appraisal of objectives and measures to make sure that they can meet the financial capacity of the city. Subsequently, a financial plan has to be prepared to fully address the financial needs of the MES and indicate funding sources. Strategies without financial plans usually become wish lists of actions that cannot be fully implemented due to financial and institutional constraints.

Successful implementation of the MES depends on the quality of the strategic planning process, as well as the preparation of a user-friendly action plan and project implementation plans, which clearly specify the implementation timeframes, responsibilities, costs, funding sources, indicators of achievements etc. Strategy implementation requires institutionalisation of the MES (for instance linking it to the multiyear investment planning) and progress implementation monitoring to check whether the expected outcomes are being achieved. Appropriate indicators need to be identified and monitored for criteria such as timing and expenditures; environmental, social and economic impact; household and community participation; environmental quality improvements, improved quality of environmental services etc.

Monitoring of implementation progress should not be limited to the end of 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 regular 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.

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# APPENDIX 1

## SUMMARY OF ENVIRONMENTAL ACTION PROGRAMME

### CASE STUDY OF CHEŁM, POLAND

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## 1. Introduction

This appendix presents an overview of the process and the product of the Chełm (eastern Poland) Municipal Environmental Strategy (MES). The Chełm MES was developed in 1998-1999 by the consortium of the National Foundation for Environmental Protection and COWI Polska. The funding was provided by the US Agency for International Development and the US Environmental Protection Agency. The objective of the project was to develop the MES in Chełm in a broad participatory approach. The project was launched with setting up the local stakeholder group (based on voluntary input), which was expected to play a leading role in developing the Chełm MES. The group comprised residents of Chełm, representatives of the city council and the Board, industry, education, the health care representatives, professional services dealing with environmental management and school pupils.

The consultants' roles were restricted mainly to facilitate the stakeholder group input, provide methodology, technical input (primarily comparative risk analysis), and compile the Chełm MES document.

The results of the stakeholder group's work and information about environmental management problems in the town were presented during a number of education and information campaigns undertaken within the framework of this project by the stakeholder group and local mass media, as well as during a public survey, conducted with the help of Chełm's high-school pupils. The presentation of results was also organised for the Board and representatives of the city council.

The strategy that was developed with such a broad public involvement constitutes the basis for future activities of Chełm's authorities and municipal environmental services. Although a voluntary character of the document did not allow detailed technical descriptions of proposed solutions, its undoubted benefit was the fact that it included a detailed identification of the matters considered most important by Chełm's residents.

The stakeholder group learnt to use a methodology that may be applied for the development of similar plans (e.g. Chełm's sustainable development strategy). The experience gathered in this respect and the practical skills acquired in reaching consensus are equally valuable, and perhaps even more valuable than a document itself. In order not to lose such an important experience and ensure implementation of the strategy, the stakeholder group decided to continue its operations after the completion of the project. It was agreed that the *Association of Local Environment Action Programme - Chełm* (LAŚ) will become the implementing agency for the Chełm MES.



## **2. Analysis of Existing Situation**

### **2.1 Profile of the City**

The city of Chełm is located in the eastern part of Poland. It is the capital of the Chełm county. Chełm covers the area of 35.72 km<sup>2</sup> and has a population of 70,000 inhabitants. It is situated on the important international highway and rail line Warsaw – Lublin – Chełm – Kiev. The town has convenient road connections with border crossings to Ukraine and Belarus.

Large chalk deposits are located to the east of the city. The chalk is presently used as a basic raw material for the production of bricks by a local cement industry. Chełm has a convenient location and capacity to play the role of a regional centre for trade with Ukraine. A number of companies located in the town have commercial ties and well established positions with eastern partners.

The town is well positioned to develop a tourism industry based on its rich natural and cultural heritage. There are many valuable historical monuments within the town and in its close vicinity. In the immediate vicinity (from 3 to 10 km) there are unique peatbogs classified as nature reserves. The Chełm Peatbogs and the Poleski National Park, about 60 km from Chełm, become popular destinations for specialist nature expeditions.

### **2.2 Identification and Analysis of the Main Environmental Problems**

The stakeholder group for the Chełm MES identified the most important environmental problems in the city, which included:

- air pollution caused by “low” emissions from individual houses;
- environmental pollution resulting from the heat loss;
- environmental pollution caused by waste;
- pollution of groundwater;
- pollution of surface water;
- lack of balance between urban areas and green areas;
- nuisance caused by road traffic;
- insufficient level of environmental awareness.

Using the *comparative risk analysis* method, the stakeholder group supported by the consultants analysed the risks related to these problems, appraising their importance or the severity of their effects. The potential/likely harmful effect was evaluated for the following components:

- human health;
- the natural environment;
- the quality of life for the population of the town.



Prior to appraising the scope and effects of the environmental problems, the stakeholder group drew up and adopted qualitative criteria for the appraisal of the risk magnitude, which were then used for conducting the *comparative risk analysis*.

In order to ensure comparability of the evaluation criteria, the risk criteria were defined in a five-point scale (*extreme, high, significant, low, or no risk*). The most important decisions and conclusions of the analysis are presented in synthetic form below.

### **2.2.1 AIR POLLUTION CAUSED BY LOW EMISSION FROM HOUSEHOLDS**

It was found that one of the most significant factors affecting air quality in Chełm is “low emission” from individual houses burning hard coal. Individual heating systems using hard coal are still used in many individual houses and multiple-family buildings, including the areas where connection to the gas network or district central heating system is possible. Burning of hard coal is related, amongst other things, to the higher unit price for the gas used for heating than for hard coal, and to the high costs for gas installation or connections to the urban central heating system.

The pollution emitted from individual houses and small coal-fired local boiler houses includes the widely known basic pollutants related to power generation: dust, sulphur dioxide, and nitric oxides, but also polycyclic aromatic hydrocarbons (PAHs) including benzo-a-pyrene which is a compound with a proven highly carcinogenic nature. These are the by-products of burning hard coal and other low quality fuel at low temperatures with restricted oxygen availability.

Indeed, this situation is made worse by the burning of various types of flammable waste in household stoves, e.g. plastic packaging. In regions dominated by individual heating systems this can increase the degree of air pollution with particularly dangerous substances emerging when burning complex organic compounds (polycyclic and halogen-derivative hydrocarbons). When compiling this strategy it was estimated that about 40% of Chełm’s population is permanently subject to the influence of pollution related to “low emission”.

### **APPRAISING THREATS TO HUMAN HEALTH**

The concentration of key pollutants had not exceeded the legal (e.g. the annual-average concentrations for SO<sub>2</sub> reached 4.5-11.5% MAC [*maximum allowable concentration*], NO<sub>x</sub> – 30-44% MAC, and dust – 9-30% MAC. However, experience from other cities in Poland indicates the possibility of the MAC being exceeded in the case of benzo-a-pyrene. Consequently, it was assumed that the emission of polycyclic hydrocarbons constitutes the greatest threat to the health and life of the Chełm residents. Using the health risk analysis methodology, it was estimated that the forecast concentrations of PAHs could cause 6 additional deaths a year

in Chełm's population resulting from the increased cancer and respiratory system illness rates. Consequently, the threat to human health was defined as *high*.

#### **APPRAISING THREATS TO NATURAL ENVIRONMENT**

The relatively low level of air pollution observed in recent years in the town (considering the key pollutants) did not indicate that the emission of pollution from dispersed local sources (low emission) was causing the widely occurring and visible damage to the town's ecosystem. Nevertheless, such pollution undoubtedly caused a temporary increase in the concentration of sulphur dioxide and nitric oxides, substances causing severe acidification of the environment (during the heating season, the average monthly concentrations of SO<sub>2</sub> reached 18% of the MAC, and for NO<sub>x</sub> – 49% of the MAC). This is causing a reduction in plant resistance and changes in their conditions. It was noted that in the central parts of the city lichens were rapidly declining – an indication of deteriorating air quality. However, as these changes were not causing any significant harm to the functioning of ecosystems, the stakeholder group agreed that the *ecological* risk caused by “low emission” is *low*.

#### **APPRAISING THREATS TO QUALITY OF LIFE**

The feeling of discomfort related to “low emission” was found relatively common amongst a fair proportion of the inhabitants of the town. Most members of the stakeholder group claimed that the nuisance related to “low emission” was noticeable for them, and it caused discomfort related to a reduced sense of aesthetics, additional costs incurred for maintaining cleanliness, and a sense of responsibility for the quality of the environment which future generations would live in.<sup>2</sup> However, the stakeholder group considered the risk to *quality of life* caused by “low emission” to be *low*.

#### **2.2.2 ENVIRONMENTAL POLLUTION RESULTING FROM THE HEAT LOSS**

About 60% of the population of the town use its district central heating system. However, the significant loss of heat in the heat exchangers, in the old heat distribution lines and the heat losses through insufficiently insulated building walls and windows cause an increase of output and consequently excessive emission of pollution into the air.

#### **APPRAISING THREATS TO HEALTH AND ENVIRONMENT**

The threats caused to health and the environment by the increased environmental pollution resulting from the energy loss are in line with the “low emissions”. The stakeholder group defined these threats as follows:

- human health risk: *significant*;
- ecosystems risk: *low*.

**APPRAISING THREATS TO QUALITY OF LIFE**

The significance of heat energy loss for the quality of life relates mainly to its impact on the family budgets. This is because heat losses cause a rise in output and consequently rise in the heating costs. After estimating the additional costs, the stakeholder group determined that excessive financial costs related to heat loss valued about 3 Euro/inhabitant per month, which was defined as a *low* risk.

**2.2.3 ENVIRONMENTAL POLLUTION CAUSED BY WASTE**

The municipal waste management in Chełm involved mainly the collection of mixed waste from households, businesses and industries within the town, transport and disposal of the waste in the municipal waste dump located in Srebrzyszcze. Of the total waste volume, only a small quantity of broken glass and waste paper was separately collected and reused.

The municipal waste dump had been in use since 1961. It covered the area of 5 hectares. The waste dump also accepted some types of industrial waste and sewage sludge. This is an old dump without any protection measures against the infiltration of leachate to groundwater, and it requires urgent recultivation. The dump is located near the “Bariera” water intake, currently the main drinking water supply source. Contamination of groundwater with leachate from the dump was observed in the distance of 500 m from the site. It is considered that it did not pose a threat to the municipal water supply system. However, the inhabitants of nearby settlements are under a potential risk due to the poor quality of local groundwater used for the drinking water supply.

The largest industrial waste dump is located within the grounds of the Chełm cement works. It contains waste of various classes of nuisance. The dump negatively affected the landscape around the cement works, and it caused contamination of soil and water around the dump with chromium compounds. This pollution was believed to be migrating towards the “Bariera” water intake.

The hospital waste was incinerated in the municipal hospital waste incinerator. The incinerator did not meet the environmental standards of a modern hazardous waste incinerator. Another problem which was not addressed was the disposal of medical and veterinary waste produced in private practices, as well as the oil-derivative waste substances, out-of-date herbicides and their containers, and batteries, bulbs, and other communal hazardous waste. Most of those wastes were disposed in the municipal waste dump, increasing the level of chemical, sanitary, and epidemiological threat in the vicinity of the dump. This pollution has an effect especially on the local water and soil conditions, and on the dump workers.

There were at least five small illegal waste dumps within the town, which were systematically littered, and then periodically cleaned up by the municipal services. Such practices, forbidden and violating the demands of environmental protection,

led to the deterioration of the environmental quality and the local aesthetic values, and could also constitute a potential threat to the soil and water quality, the functioning of the local ecosystem, and potentially also to human health and life.

#### ***APPRAISING THREATS TO HUMAN HEALTH***

There is a considerable risk that the chromium compounds contamination would migrate in the shallow aquifer in the surroundings of the Chełm cement works' industrial waste dump.  $\text{Cr}^{+6}$  compounds are toxic and should not be present in drinking water in concentration higher than 0.01 mg/l. If the contamination spreads to the "Bariera" groundwater intake, the drinking water supply for the city could be put at risk.

The illegal waste dumps appearing occasionally in a local scale were not considered a significant threat to human health in the city. However, it cannot be ruled out that hazardous or toxic substances are dumped in the illegal sites causing local contamination.

Because of the above it was accepted that, although there was no real direct threat to public health caused by poor waste management, neglect and in particular lack of preventive measures could lead to irreversible human health problems. Consequently, the threat to public health was defined as *potentially high*.

#### ***APPRAISING THREATS TO ENVIRONMENT***

There was evidence that dumping of both communal and industrial waste caused groundwater contamination within the radius of 500 m of the municipal waste dump in Srebrzyszcze, and in a significantly greater radius around the magnesite-chrome brick dump. The specific properties of the chalk aquifer indicated that contamination can accumulate and remain in the strata for decades.

Consequently, the contamination posed a threat to the groundwater resources including the "Bariera" intake, which is used by the city for drinking water supply. This constituted a *very high* threat to the environment.

#### ***APPRAISING THREATS TO QUALITY OF LIFE***

The migration of the chromium contamination in groundwater causes a threat to the quality of life for the inhabitants of Chełm. This could lead to the following consequence:

- restricted access to natural resources for the entire community;
- a necessity to spend a significant part of the municipal budget on establishing a new water supply source;
- an unavoidable rise in the cost of water.

The stakeholder group recognised that the threat related to the contamination of groundwater resulting from industrial waste dumping should be classified as *high*.

#### **2.2.4 POLLUTION OF GROUNDWATER**

The groundwater resources are the only available source of water supply for the inhabitants and industry of Chełm. The municipal water mains system currently supplies water drawn mainly from the “Bariera” intake, a set of 15 wells located within the grounds of the chalk mine at the Chełm cement works. The second source of Chełm’s water supply is the “Trubaków” intake opened in 1939. The water from this source is subject to de-ironing and chlorination.

In the county of Chełm the groundwater in all aquifers is of high quality. However, the geological conditions (mainly highly permeable and fissured chalk beds) allow an easy migration of contamination, such as leaks from the sewers and storm drains, leaking cesspits, leachate from municipal and industrial waste dumps, oil-derivative product pollution etc.

Contamination in the area of the “Bariera” water intake is amongst the most serious threats to groundwater identified - and especially so for the toxic  $\text{Cr}^{+6}$  compounds, of confirmed carcinogenic nature. The primary source for this contamination is the industrial waste dump of the Chełm cement works. The area and extent of groundwater pollution in this region has significantly increased since 1996. As a result of chrome concentrations exceeding the drinking water standards, six wells of the “Bariera” intake were disconnected from exploitation. Another potential threat for the “Bariera” intake could be the municipal waste dump in Srebrzyszcze (located 2 km from the water intake), where contamination by leachate was detected up to 500 m from the dump.

A basic threat to the quality of groundwater is posed by the uncontrolled discharge of sewage into the ground. This is related to the lack of sewers in some parts of the town and a low environmental awareness of many households using septic tanks.

The water from the “Trubaków” intake was threatened in the past by the contamination of soil and water with oil-derivative products coming from the overloaded fuel base. Contamination of groundwater with oil-derivative products has also occurred in the vicinity of petrol stations and it was found to be rising.

The exploitation of the groundwater resources by municipal and industrial intakes has significantly transformed the natural system of the water circulation in the region of Chełm, and brought about the emergence of a 25 m deep depression sink. Visible drying of agricultural land has occurred in the region of the town and around, affecting even the nearby bogs declared nature reserves.

**APPRAISING THREATS TO HUMAN HEALTH**

Most of the population of the town (about 94%) is supplied with water from its water mains network. The risk of groundwater contamination by the  $\text{Cr}^{+6}$  compounds is significant. However, the regular monitoring of drinking water greatly reduces the risk of direct exposure of contamination to the local population. Nevertheless, if drinking water contamination by chromium compounds took place, it would have very serious health consequences for the population.

At the same time about 6% of the inhabitants use shallow individual household wells. Most of them show an occurrence of microbiological contamination (caused by pollution from septic tanks), and an elevated concentration of nitrates and nitrites, which cause significant threat to human health (contagious and blood diseases). Consequently, the stakeholder group rated this threat as *high*.

**APPRAISING THREATS TO ENVIRONMENT**

Contamination by chromium compounds brought about an irreversible or difficult to remediate degradation of a significant proportion of shallow groundwater resources. The stakeholder group rated the related threat as *very high/extreme*.

**APPRAISING THREATS TO QUALITY OF LIFE**

The potential risk of closing down the key sources of drinking water supply for the city poses a threat to the quality of life. The city would have to spend large sums exceeding 1/3 of its annual budget over a period of several years to change the source of drinking water supply. This would obviously lead to an increase of the drinking water tariffs, and a cancellation of a number of municipal projects due to diversion of funding. Consequently, the stakeholder group rated the threat to the quality of life as *high*.

**2.2.5 POLLUTION OF SURFACE WATER**

Chełm has an extensive sanitary sewerage system covering most of the city area, although some individual houses have not yet been connected to the sewers. About half of the city area is covered by storm sewers, with twelve discharge points to the river Uherka (two discharge points are fitted with pre-treatment equipment). Domestic and some industrial sewage from smaller plants are treated in the municipal sewage treatment plant. This modern mechanical-biological plant was opened in 1996 and the treated effluent meets all legal quality standards. The plant treated 12-16,000 m<sup>3</sup> of sewage/day but it has a capacity exceeding 19,000 m<sup>3</sup>/day. The spare capacity enables extension of the sewerage system in the city.

The effluent is discharged to the river Uherka flowing through Chełm. The upper course of the Uherka is of high quality. However, below Chełm the river fails to meet biological and biogenic standards. The Uherka river has limited recreational value due to its past pollution and limited leisure infrastructure. Neither is the river an important water supply source.



It was determined that the practice of illegal discharge of sewage into the soil, the rainwater drains, or directly into the river was relatively common. The discharge of sewage from building cesspits connected illegally to the storm sewers and the drainage of stormwater from the town area without sufficient treatment, were found to be the main sources of river pollution.

#### ***APPRAISING THREATS TO HUMAN HEALTH***

The Uherka is not polluted by toxic substances, and the organic pollution below the city poses limited threat to human health, because the residents do not currently use the river for recreation, for drinking water supply, or for other commercial purposes. Consequently, the stakeholder group defined the health risk as *low*.

#### ***APPRAISING THREATS TO ENVIRONMENT***

The long-lasting organic pollution of surface water affected the functioning of the ecosystem of the river, including a drop in the biological diversity. Consequently, the stakeholder group decided that the threat for the environment is *high*.

#### ***APPRAISING THREATS TO QUALITY OF LIFE***

Organic pollution of the river, the lack of appropriate recreational infrastructure along the river banks, and the littering of the river valley led to disuse of the Uherka for economic use and recreation. Hence, the stakeholder group decided that the pollution of surface water posed a *very high* threat for quality of life.

### **2.2.6 IMBALANCE BETWEEN URBAN AREAS AND GREEN AREAS**

The city of Chełm is generally green with most streets and squares dotted with trees, 38% of agricultural land and 7.5% of forest within the city boundaries. However, green areas of high recreational and leisure values (such as parks or district squares) cover barely 3% of the town area. The park infrastructure is poor (with insufficient lighting, benches, litter bins, play areas, cycle paths, and public conveniences). New housing estates are particularly poor in managed green areas.

The town lacks an integrated management and planning of recreational and leisure areas, rather the work is commissioned out to various units. However, the stakeholder group determined that this problem would not be considered a factor causing risk to human health, the environment, and the quality of life for the city residents. Nevertheless, the task of establishing the correct balance between the urban green areas and built-up areas should be treated as important for buffering negative anthropogenic effects.

### **2.2.7 NUISANCE CAUSED BY ROAD TRAFFIC**

A significant increase in the road traffic was observed in Chełm in the 1990s as result of the rise in the number of private cars, and transit traffic to the border crossing with Ukraine. There was a rise noted in the quantity and unit tonnage of vehicles driving along the town roads and a related increase in noise, vibration,

and emission of exhaust gases. The layout of the central streets and their technical conditions were not prepared for heavy transit road traffic. In addition, the town has no bypass road to divert the heavy traffic from the central and residential parts of the city. The nuisance related to increased road traffic (exhaust fumes, noise and vibration, loss of safety for vehicles and pedestrians) is felt mostly by residents living along the main streets and within the Town Centre. Monitoring conducted indicate that admissible noise levels in these areas were exceeded by as much as 56% during the day.

The residents of Chełm travel from the larger housing areas to the central part of town which hosts most commercial and service buildings, jobs, and schools; and towards the industrial district and the Chełm cement works. These main traffic routes were found adequate. Public transport is managed by the Chełm Bus Lines (CLA) and smaller transport companies. Fleet wear is generally high, above 70%. Most vehicles were from the years 1981-1992, there was also a fleet of new smaller buses. The change in the routing of CLA buses was criticised; the buses were set to take significantly longer routes, and travel time increased. In some cases, buses drove through residential areas along roads not suitable for manoeuvring large vehicles.

#### **APPRAISING THREATS TO HUMAN HEALTH**

There are significant health nuisance problems related to road traffic: noise, vibration and emission of exhaust gases containing a whole range of substances harmful to health. The concentration of benzene (a compound with confirmed carcinogenic impacts and a distinctive indicator of emission from petrol engines) was selected as indicator reflecting a threat to human health. It was estimated that the increased concentration of benzene along the traffic routes (on average around 5  $\mu\text{g}/\text{m}^3$ ) could cause almost 3 additional cancer cases a year. The stakeholder group recognised this risk as *significant*.

#### **APPRAISING THREATS TO ENVIRONMENT**

The increased concentration of harmful substances such as nitric oxides, sulphur dioxide, or ozone from photochemical smog cause changes to the ecosystems and biodiversity. The stakeholder group defined the threat to environment as *significant*.

#### **APPRAISING THREATS TO QUALITY OF LIFE**

Road traffic nuisance has a negative effect on the quality of life for the Chełm residents by bringing about a sense of discomfort, reduction in local aesthetics, restricted relaxation possibilities (due to noise), and a downfall in the sense of safety. These factors occur on a regular basis and affect the residents through the greater part of the day. The stakeholder group defined this threat as *significant*.



### 2.2.8 INSUFFICIENT LEVEL OF ENVIRONMENTAL AWARENESS

Environmental awareness in Chełm was generally low. The city lacked important institutions and organisations with appropriate scope of influence to conduct environment educational programmes addressed to a wide audience, and facilitate discussions, exchange of experience, and contacts among interested parties. The Board of the Chełm Landscape Parks took steps aimed at the environmental education of children at primary and secondary schools.

The stakeholder group recognised that this problem cannot be subject to a comparative risk analysis, although it is of key importance for addressing all environmental management problems in the town, and should, as a result, have an appropriate place in the MES.

## 2.3 Summary of Analysis of the Existing Conditions

### 2.3.1 RESULTS OF COMPARATIVE RISK ANALYSIS

The table below summarises the results of the *comparative analysis of risks* for health and quality of life of the residents of Chełm, and for the quality of the natural environment of the town.

Problem Area	Threat		
	Health	Environment	Quality of Life
Air pollution caused by “low” emission	Significant	Low (Significant)	Significant
Environmental pollution resulting from the heat loss	Significant	Significant	Low
Pollution of the environment with waste	Potentially high	Extreme	Significant / high
Contamination of groundwater	Low (further tests)	Significant	Significant
Pollution of surface water	Low	High	Very high (extreme)
Nuisance caused by road traffic	Significant	Significant	Significant

### 2.3.2 HIERARCHY OF PROBLEMS BASED ON THE STAKEHOLDER GROUP’S APPRAISAL

Results of the risk analysis allowed the stakeholder group to rank the environmental problems in the city in the following way (in the order of importance):

1. *pollution of groundwater;*
2. *pollution of the environment with waste;*
3. *pollution of surface water;*
4. *nuisance caused by road traffic;*
5. *air pollution caused by “low emission”;*
6. *environmental pollution resulting from the heat loss.*

### 2.3.3 HIERARCHY OF PROBLEMS BASED ON PUBLIC APPRAISAL

In order to analyse the public environmental awareness in the city, a public opinion survey was conducted in Chełm regarding the perception of environmental problems and threats. Over 800 completed questionnaires were obtained, with answers to questions regarding the quality of the environment in Chełm and the importance of specific problems and their related threats. Aggregation of the responses resulted in the following hierarchy of environmental problems (compare with the ranking of the stakeholder group put in brackets):

1. *pollution of the environment with waste (2);*
2. *air pollution connected to “low emission” (5);*
3. *traffic nuisance (4);*
4. *pollution of groundwater (1);*
5. *pollution of surface water (3);*
6. *contamination of the environment resulting from heat energy loss (6).*

The survey results revealed that the residents rated the environmental problems according to the direct level of nuisance caused by them.

### **3 Setting Objectives and Directions for Addressing Problems and Eliminating Threats**

The appraisal results of the importance and consequences of environmental problems identified during the previous stages of the MES making led to the definition of the following general objectives which Chełm should achieve during the execution of the strategy:

- to protect groundwater from contamination and counteract the effects of groundwater contamination;
- to organise and implement a solid waste management system friendly for the environment and for the residents;
- to limit the influence of the town on the Uherka river and take advantage of its recreational and landscape-forming values;
- to create a transport system friendly for the residents and visitors and causing minimal nuisance;
- to reduce atmospheric pollution to a level meeting the legal standards;
- to create a coalition between industrial plants and the municipal community with a view to foster environmentally friendly development;
- to develop recreational and leisure facilities and turn Chełm into a green town;
- to increase the environmental awareness of the residents.

#### **3.1 Protection of Groundwater Resources**

The specific objectives that the town must achieve in order to ensure maximum protection of the groundwater resources (the only significant and easily accessible source of water supply for the city) are:

- to direct all sewage to the sewers and appropriate treatment;
- to eliminate dispersed sources of pollution;
- to enforce consistent protection of water resources in sensitive zones.

In addition, it is essential that the effects of the environmental threats of groundwater resources be counteracted by

- limiting the migration of pollution;
- safeguarding appropriate quality drinking water for the city;
- limiting the irreversible management of local water resources.

In particular, the execution of water protection must be improved and effective. A number of measures can be introduced in this respect. For instance, the past or present polluters of soil should be forced to stop the present practices causing contamination and clean-up past pollution (following Article 82 of the Law on Environmental Protection). This instrument should be used in particular for ensuring appropriate quality of the water drawn from the “Bariera” intake, which is currently the main source of the municipal water supply. Such measures should focus on ventures possible from a technical and economic point of view including:

- preventing the infiltration of contamination to groundwater;
- appropriate safeguarding and recultivation of facilities posing a threat to groundwater (such as industrial and municipal waste dumps);
- using organisational and technical means limiting the spread of pollution which cannot be eliminated (e.g. the appropriate exploitation of resources in contaminated areas).

The introduction of appropriate legal to protect the groundwater at the planning and implementation stages of new projects is also essential. This can be done by introducing protection zones in the new spatial management plan for the city, implementing effective procedures for both the investors and the local government.

In addition, all water saving measures and prevention of excessive drainage of the city area should be introduced to maintain a sufficient quantity of groundwater for future generations and for the municipal development.

### **3.2 Safe Waste Management for the Environment and the Residents of Chełm**

The following specific objectives need to be implemented to achieve a satisfactory waste management system in the city:

- to complete the implementation of the Law on Order and Cleanliness in Towns, and the Waste Act;
- to improve the waste disposal system;
- to increase the degree of the commercial re-use of waste and recycled materials produced in the town, and consequently reduce waste transport and dumping costs;
- to eliminate illegal dumps and cases of irregular waste transfer;
- to address the issue of neutralisation of hazardous waste;
- to solve the issue of the utilisation of sewage sludge from the municipal sewage treatment plant.

The town should revise and update the 'Concept for the disposal of municipal waste in Chełm' prepared in 1997. The waste management scenario presented in the Concept, based on selective collection, composting and landfilling the co-mingled waste, should be appraised financially and a detailed Solid Waste Management Plan should be prepared.

The existing and the old cells of the municipal dumpsite need to be closed down and recultivated. In parallel, the new cells of the sanitary landfill should be built within the land which the city acquired next to the present dumpsite.

Immediate steps should be taken to create a system of selective waste collection in the city. In the first phase the selective collection of waste should concentrate on

glass, paper and cardboard, and on raising awareness. Selection and segregation of solid waste will enable a significant reduction of the investment costs to construct the final disposal facility.

The city should also initiate selective collection of municipal hazardous waste to allow safe handling and disposal. This refers particularly to oil-derivative substances, out-of-date herbicides and their containers, as well as batteries and bulbs from homes and service stations. The hospital incinerator for medical waste should be modernised or shut down with subsequent treatment of hospital and veterinary waste in another location.

A more effective control of illegal dumping should be introduced and penalties should be levied more vigorously on the perpetrators.

### **3.3 Protection of Water Quality in the Uherka River and Better Utilisation of its Recreational Values**

The quality of the Uherka river below Chełm was still not satisfactory even after phasing in the sewage treatment plan. The following specific objectives are considered essential to achieve further improvement of the quality of the Uherka, and thereby improve the recreational attractiveness of the river:

- elimination of all discharge points of untreated or insufficiently-treated sewage;
- appropriate treatment of stormwater;
- extension of the sanitary sewerage network to cover the whole area of the city;
- elimination of illegal discharges of sewage to the storm sewers.

The city should step up pressure to connect all buildings located along the existing sanitary sewers. A system of economic incentives should be introduced (e.g. tax exemption) for those who establish a connection to the sewer system or who declare participation in the sewer construction costs.

To increase the recreational attractiveness of the Uherka valley, the city should develop the Uherka valley management plan and implement the optimal alternative. Most of the funding for this purpose should come from the private sector without putting burden on the municipal budget. It is therefore essential to draw up a system of incentives which would encourage investors' interest in executing the plan.

Analysis of the sewage sludge should be completed and decision should be taken whether the sludge quality is adequate for application in agriculture, and if not, what utilisation/disposal options are recommended.

### **3.4 Reduction of Nuisance from Traffic**

The following specific objectives aimed at reducing the traffic nuisance in the city are considered of primary importance:

- to solve traffic problems in the old town;
- to separate transit and local traffic in the city.

In particular it is essential that road traffic be curtailed in the area of the old town focusing on heavy vehicles and public transport. Limited parking zones with progressive charges favouring parking shorter than 30 minutes should be introduced.

The public transport vehicle routes should be verified and simplified. The following options should be preferred:

- simple routes connecting relatively distant areas of the town;
- sufficient frequency (e.g. once every 15 minutes during peak hours, and once every 30 minutes at other times);
- appropriate vehicle speed (with a maximum of 30 minutes between the end stops)
- frequent junctions with other bus lines;
- access to the nearest bus stop in all city locations not exceeding 3 to 5 minutes walk;
- bus routes should not be introduced in quiet residential areas, which have local streets inappropriate for the manoeuvring of large vehicles.

The public transport fleet should be systematically renewed or modernised, taking into account their emission levels and fuel consumption.

A system of preferential charges for combined routes and one-day, weekly, and monthly zone tickets should be designed and put into effect, encouraging the inhabitants and visitors to use public transport.

For people coming into town the park-and-ride type car parks should be established in the outskirts of town, where the parking fee would simultaneously be a zone ticket for municipal public transport.

An inspection should be made of the condition of roads threatened by heavy traffic, taking special account of the state of the road surface (regarding the increased noise levels on uneven sections) and the functioning of the traffic lights (for efficient traffic flow and to stimulate the preferred driving speed). On this basis a modernisation plan should then be drawn up for elimination or at least a significant reduction of the level of noise and vibration and accident risk.

It is also essential that a concept for improving the street layout in the southern part of town and the by-pass road (to divert transit traffic out of the town) be drawn up and executed.

### **3.5 Reducing Atmospheric Pollution to Legally Binding Standards**

The following specific objectives addressing the atmospheric pollution in the city should be addressed:

- to reduce low emissions in the city (starting with houses burning poor quality fuel);
- to minimise the heat loss in the district central heating system;
- to construct a natural gas supply network as an alternative energy source.

It is particularly essential that the planned modernisation of the heat distribution system (partially under way) be accelerated, including replacing the pipes (for insulated ones), older types of heat exchangers and hydro-elevators, and draughty windows, as well as insulating the buildings. This should eventually reduce the consumption of fuels and thereby emissions by at least 10%.

At the same time a system of incentives should be formed for people planning to change their heat supply sources, especially for those who would like to connect to the municipal central heating system. This is because an increase in the amount of system users should bring about a reduction or at least a halt in the rise of heat energy unit costs.

### **3.6 Creating a Coalition for Sustainable Development between Industrial Plants and the Town Residents**

One of the important aspects of the municipal environment management is cooperation between industry and the local community. The city should stimulate improvement of the local economy and reduction of its environmental impacts. The following specific objectives should be addressed:

- to reduce environmental threats posed by the Chełm industry;
- to change the residents' perception of and attitude towards environmental impacts of the operations of industrial plants;
- to increase the competitiveness of the Chełm industry.

It is essential that the town take steps to establish a local agreement/coalition of businessmen for the environment. The coalition should include representatives of Chełm's industrial plants and its community. The coalition should draw up and announce a voluntary declaration of environmental management. The aim of this agreement should be to identify and implement cost-effective technical and infrastructure measures based on the best available technology approach. The mayor should open an annual Competition for the Chełm Environmental Leader, which would identify and award the companies in Chełm that achieved the most impressive environmental progress. Results of these measures should be disseminated in the city to stimulate greater environmental awareness amongst the inhabitants.



### **3.7 Development and Upgrading of Green Areas and Leisure Facilities**

In order to achieve the optimal equilibrium between green and urbanised areas in the city the following specific objectives should be dealt with

- to extend and improve maintenance and management of parks, gardens, squares, and other green areas which could be used for leisure, recreation, and educational activities;
- to introduce legal, planning and organisational measures aimed at maintaining the right balance between urbanised and green areas;
- to develop and protect green areas in the housing estates.

Appropriate shaping of leisure facilities in the parks and amenity sites is vital to enhance the recreation opportunities in the city. It should be ensured that the time needed to reach a properly equipped and managed park or leisure area should not exceed 10 minutes' walk for a moderately fit person (i.e. a distance of up to 0.8 km).

First of all it is essential that more steps be taken for the preservation, appropriate management, and proper maintenance of the existing gardens and parks, squares and greens, which could be used for leisure and recreation. In addition to upgrading the existing green areas, new leisure and recreational areas should be developed. For instance, the Uherka valley is recommended to be turned into a leisure park for generally accessible recreation.

### **3.8 Stimulation of Environmental Awareness Amongst Chełm's Inhabitants**

The city should focus on stimulating pro-environment attitudes amongst the population. Social acceptance should be sought for all major infrastructure projects. The following should be accomplished:

- stimulation of the activities of social organisations and inhabitants;
- coordination and support from the Town Offices for measures related to environmental education.

Systematic ecological education for the city residents should be an integral element of dialogue with the community, and complement other environmental steps taken by the city. In particular, the introduction of environmental curricula at schools managed by the city should be supported to a greater degree by the municipal environmental fund.

Advantage should be taken of the association established during the development of the MES. The association could significantly support the activities of local authorities and contribute to the dissemination of information regarding environmental threats in town and temporary nuisances caused by the planned infrastructure projects aiming at improving the state of the environment, health and quality of life for the inhabitants.



## **4. Municipal Environmental Strategy**

### **4.1 Structure and Content of the Strategy**

The general and specific objectives accepted by the stakeholder group, and the measures proposed to address the objectives, were subsequently supplemented by a list of tasks required to implement the strategy. The list of tasks for each objective is presented in section 4.3.

The tasks identified include actions of all types (legal-administrative, technical, organisational, investment, financial, and educational) to be implemented by the authorities and municipal services. They were further expanded in the MES document. The institutions responsible for the execution of each task are highlighted, as are the execution deadlines. Wherever possible, estimates are given for implementation costs (based on the 1999 prices). A number of tasks recommended by the stakeholder group have no cost estimation, given that the action concerned fitted within the duties of specific municipal departments, and should therefore be financed from their running costs. Consequently, the specification of costs reflected mainly outsourced actions subject to the public procurement rules. It is suggested that the execution of certain steps be entrusted to local non-governmental organisations, providing them with appropriate financial and logistical support.

The list of tasks remains open. This means that the accomplished tasks may be removed from the list, whilst the changing conditions may bring about the necessity adding new ventures to the list. This refers also to the detailed execution steps, the list of which should be updated depending on the changing conditions and requirements.

### **4.2 Monitoring the Implementation of the Strategy**

The intention of the stakeholder group is that the task list constitutes guidelines for drawing up annual and multi-annual working plans for all departments and municipal services. Consequently, it is essential that the city council tasks its subordinate departments to systematically implement the strategy. If any tasks prove not feasible to execute, the responsible departments should justify their exclusion.

It is recommended that a register of implemented tasks, tasks under implementation, and tasks planned be kept by the Environmental Protection Department of the city hall. All departments of the city administration should provide the Environmental Protection Department with reports on the execution of the specific MES tasks.

The city hall should present an annual MES progress report to the city council and make it available to the general public. The Environmental Protection Department should also regularly monitor changes in the Polish environmental legislation and subsequently update the MES.

### 4.3 List of objectives and detailed tasks

Strategic Objective	Specific Objective	Tasks	Responsible (for abbreviations see end of table)	When	Cost (1999 prices) 1 USD = 4 PLN
<b>1. Protection of groundwater from contamination</b>	1.1 Directing all sewage to sewers and/or for treatment	1.1.1 Executing the sewer system extension programme (for the current and future requirements of the town)	BIM, MP GK, GFOŚIGW	1999-2010	1.9-2.1m PLN
		1.1.2 Creating a system of incentives mobilising individuals to connect to the sewer system	GFOŚIGW, MP GK, ZM, WF, WGMK	1999-2010	150,000 PLN
		1.1.3 Effective execution of the law	WOŚ, SM, MP GK, UM law-yers, WGKL	1999 - running task	10,000 PLN
		1.1.4 Awareness raising programme addressing threats caused by pollution migrating into the soil and groundwater from leaking septic tanks	WOŚ, MP GK, LAŚ	1999 - running task	35,000 PLN
	1.2 Elimination of dispersed pollution sources	1.2.1 Proper management of agricultural land within the town limits	WOŚ, SM, WGPA, land owners and administrators, LAŚ	1999 - running task	40,000 PLN
		1.2.2 Reducing the threat caused by rainfall infiltrating into the ground from areas without sewers or drains	WOŚ, MP GK, SM, BIM, LAŚ, Police, IOŚ, land owners and administrators	1999 - running task	50-60,000 PLN
	1.3 Consistent protection of water re- sources in sensitive areas	1.3.1 Identification of sensitive zones and defining the conditions for commercial operations in these areas	WOŚ, MP GK, WGKL, WGPA, sanitary services, organisa- tion units, IOŚ	1999 – running task	400,000 PLN
		1.3.2 Setting up and launching a monitoring and management system protecting the land from contamination by new investment projects.	WOŚ, WGPA, sanitary serv- ices, IOŚ	1999 – running task	Running costs
	1.4 Limiting the spread of contamina- tion	1.4.1 Appropriate operation of the “Bariera” intake	WOŚ, MP GK, cement works, IOŚ, sanitary services, MP GK	1999 – running task	Running costs
		1.4.2 Recultivation of the cement works dump	WOŚ, ZM	1999 – after closing down the dump	Running costs
<b>1.a Counterac-ting the ef- fects of con- tamination</b>	1.5 Ensuring ap- propriate quality drinking water for the inhabitants the town’s	1.5.1 Preparation of an alternative water supply system for the town independent of the cement works (the Garka and Bariera Bis intakes)	BIM, WOŚ, MP GK, WGMK, GFOŚIGW, WFOŚIGW	1999 – should de- fine threshold con- ditions	200,000 PLN documentation; 1.5-6m PLN execution
	1.6 Limiting the ir- retrievable usage of local water resources	1.6.1 Consideration of alternative management possibilities for wa- ter from drainage of the chalk mine at the Chelm cement works	WOŚ, cement works	2003 – 2010	Running costs

Strategic Objective	Specific Objective	Tasks	Responsible (for abbreviations see end of table)	When	Cost (1999 prices) 1 USD = 4 PLN
2 Organisation and implementation of a waste management system safe for the environment and inhabitants	2.1 Complete implementation of the provisions of the Law on Maintaining Order and Cleanliness in Towns and the Waste Act	2.1.1 Preparing and implementing a procedure for co-ordinating waste management programmes for waste producers	WOŚ	1999 – running task	15-20,000 PLN
		2.1.2 Preparation for the development of a waste management plan for the town (adjustment to meet the EU regulations)	WOŚ, MPGK	2000 – running task	Running costs
	2.2 Improving the waste disposal system	2.2.1 Opening up a new waste dump	BIM, MPGK	1999 - 2002	250,000 PLN documentation; 3-7m PLN investment
		2.2.2 Recultivation of the present waste dump	MPGK, BIM, IOŚ, sanitary services	1999 – running task	1.3m PLN
	2.3 Maximising the commercial utilisation of waste and recycled materials produced in town: reduction of waste transport and dumping costs	2.2.3 Usage of the municipal waste dump - in a manner enabling extension of its lifetime and limiting the requirements for extension	MPGK, WOŚ, IOŚ, sanitary services	2002 - running task	15,000 PLN documentation; 0.7 - 1 m PLN machinery and equipment
		2.3.1 Preparing and carrying out a programme for selective collection of waste, their recycling and utilisation	MPGK, WOŚ, targeted funds, ZM, RM	2000 – running task	1.3 - 1.6m PLN
	2.4 Elimination of illegal dumps and irregular waste collection	2.3.2 Conducting an information programme on selective waste collection and promotion of its benefits	MPGK and other waste collectors, WOŚ, SM	2001 – running task	80,000 PLN
		2.4.1 Providing all real estate owners with contracts for waste collection	WOŚ, WE, OM	1999 – running task	10,000 PLN
	2.5 Reducing the threat related to hazardous waste	2.5.1 Providing all producers of medical and veterinary waste with an appropriate system for rendering this waste harmless	WOŚ, SM, IOŚ, WZIPS	1999 – running task	250,000 PLN
		2.5.2 Launching a system of collection and harmless disposal of dangerous communal waste (batteries and bulbs etc.)	WOŚ, MPGK and other collectors, LAŚ	2001 – running task	170 - 200,000 PLN
	2.6 Reducing the threat related to sewage sludge	2.6.1 Utilisation or safe disposal of sewage sludge	MPGK, ZM, WOŚ, sanitary services, IOŚ	1999 – running task	for definition after concept acceptance

Strategic Objective	Specific Objective	Tasks	Responsible (for abbreviations see end of table)	When	Cost (1999 prices) 1 USD = 4 PLN
3 To limit the influence of the town on the Uherka river and take advantage of its recreational and landscape-forming values	3.1 Eliminating the discharge of untreated sewage into the river	3.1.1 Eliminating illegal connections to the stormwater drains or direct river discharge points	MPGK, SM, WOŚ, WGPA	2000 – running task	execution costs
		3.1.2 Launching a system of registering and controlling sewage disposal	MPGK, SM, WOŚ	2000 – running task	30-40,000 PLN
		3.1.3 Increasing the inhabitants' awareness regarding the discharge of sewage and waste into the storm drains or directly into the river	WOŚ, LAŚ	2000 – running task	15-20,000 PLN
	3.2 Treating rain-water and correct operation of existing equipment treating such water	3.2.1 Building separators at the river discharge points on rainwater channels	ZDM, BIM, MPGK, ZDM, land owners and administrators	1999 – running task	1.3-1.5m PLN
	3.3 Making use of the recreational values of the river	3.3.1 Implementation of a new management arrangement for the Uherka river valley	WGPA, WSP, ZM, MOSiR, private and institutional investors	1999 – 2010	To be determined when concept is approved
4. To create a transport system friendly for the residents and visitors and causing minimal nuisance	4.1 Solving the traffic problems in the Old Town	3.3.2 Land activation programme for the Uherka river valley	land owners and administrators, ZM, RM, BIM, MOSiR	1999 – running task	400-500,000 PLN
		4.1.1 Limitation of road traffic within the Old Town	ZDM, ZM, RM, Police, SM, WOŚ	2000 – running task	1m PLN + investment costs
	4.2 Segregating transit and local road traffic	4.2.1 Reducing nuisance related to road traffic	ZDM, CLA, private carriers, vehicle inspection centres, vehicle owners, estate administrators, WOŚ	1999 – running task	
		4.2.2 Completing construction of the southern road by-pass	ZDM, ZM, BIM	2005 - 2010	50m PLN
		4.2.3 Cooperation in designing the route and starting construction of the northern bypass	WKTD, WGPA, WOŚ	2000	10,000 PLN

Strategic Objective	Specific Objective	Tasks	Responsible (for abbreviations see end of table)	When	Cost (1999 prices) 1 USD = 4 PLN
<b>5. Reduction of air pollution to a level meeting legal standards</b>	5.1 Reducing the threat to health and the environment related to "low emission"	5.1.1 Development of infrastructure enabling elimination of some emission sources through connecting buildings to the district central heating system	MPEC, WFOŚiGW, GFOŚiGW, RM, BIM	1999 – 2010	10-11m PLN
		5.1.2 Development of infrastructure enabling individual customers to switch to gas-fired heating	gas suppliers, social/voluntary stakeholder groups for gas network construction, individual customers, BIM, WFOŚiGW, GFOŚiGW, RM, WOŚ	1999 – running task	17m PLN
		5.1.3 Launching incentives for individual customers, stimulating choice of the heat supply source preferred for the area concerned	WF, targeted funds, ZM, private customers, WGPA, WOŚ	1999 – running task	5,000 PLN
		5.1.4 Raising social awareness regarding threats related to the incorrect operation of heating systems, and methods for limiting these threats	WOŚ, media, LAŚ	1999 – running task	25-30,000 PLN
	5.2 Reducing heat losses in the district central heating system	5.2.1 Modernisation of town district central heating stations / boiler-houses 5.2.2 Insulating recipient buildings and putting effective insulation on the distribution pipes	MPEC, BIM MPEC, estate administrators, WOŚ	1999 – running task 1999 – running task	150-350m PLN 11m PLN
<b>6. To create a coalition between industrial plants and the community of the town with a view to foster environmentally friendly development</b>	6.1 Reducing threats related to the operations of industrial plants and changing inhabitants' attitudes	6.1.1 Cooperation with industrial plants for tasks undertaken to reduce environmental nuisances	ZM, LAŚ	2000 – running task	Running costs
		6.1.2 Informing the town inhabitants (town authorities and industry) about measures reducing environmental threats	ZM, LAŚ	2000 – running task	Running costs
		6.1.3 Taking measures encouraging industrial plants to reduce their environmental nuisance (e.g. a prize for the first company to launch the "clean production" or ISO 14000 system)	ZM, LAŚ	2000 – running task	Running costs

Strategic Objective	Specific Objective	Tasks	Responsible (for abbreviations see end of table)	When	Cost (1999 prices) 1 USD = 4 PLN
7. To develop recreational facilities and turn Chełm into a green town	7.1 Protecting greenery in generally accessible areas	7.1.1 Improving the management of greenery	WOŚ, ZDM, WGKL, WGPA, estate administration, GFOŚiGW, companies	1999 – running task	200-300,000 PLN + investment costs
		7.1.2 Increasing the attractiveness of green areas for recreational and leisure purposes	WGKL, WKK, MOSiR, ZDM, WGPA, WOŚ, WZ, PFRON	1999 – running task	500-600,000 PLN
		7.1.3 Using green areas as locations for educational activities related to the protection of nature and culture, and tourism	WOŚ, LAŚ, WKK, travel agencies, WSP	1999 – running task	80-100,000 PLN
	7.2 Protecting green areas in housing estate districts	7.2.1 Levelling out the disproportion between the urbanised and green areas	WGPA, estate administration, designers, WKK	1999 – running task	300,000 PLN
		8.1.1 Establishing the "Local Environmental Action Programme" Associations	LAŚ Voluntary stakeholder group, WOŚ	1999 – running task	100,000 PLN + campaign costs
8. To increase environmental awareness amongst the inhabitants	8.1 Stimulating the activities of social organisations and the inhabitants	8.1.2 Monitoring the process of execution for the environmental protection programme	WOŚ	2000 – running task	100,000 PLN
	8.2 Coordination and support by the city council for environmental education measures	8.2.1 Creating a post for environmental education in the city hall	ZM, RM	2000	300-500,000 PLN

BIM – Municipal Investment Department  
GFOŚiGW – Municipal Fund for Environmental Protection and Water Management  
IOŚ – Environmental Inspection  
LAŚ – LEAP (Local Environmental Action Plan) Association  
MPGK – Municipal Enterprise of Public Services  
MOSiR – Municipal Centre of Sport and Recreation  
MPEC – Municipal Enterprise of Central Heating  
OM – Teachers’ Training Centre  
PFRON – National Fund for Disabled People  
RM - City Council  
SM – Municipal Police  
UM- Town Hall  
WE – Department of Education  
WF – Financial Department  
WFOŚiGW – Voivodship Fund for Environmental Protection and Water Management  
WGKL – Department of Housing  
WGMK – Department of Land-Surveying and Municipal Property  
WGPA – Department of Physical Planning, Architecture and Building  
WKK – Department of Culture and Sport  
WKTD – Department of Transportation and Roads  
WOŚ - Environmental Department  
WSP – Department of the City Strategy and Promotion  
ZDM – Department of Municipal Roads  
ZM – City Management Board



## **APPENDIX 2**

### **OVERVIEW OF THE EU ENVIRONMENTAL LEGISLATION<sup>6</sup>**

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<sup>6</sup> This Overview was based to a considerable extent (except the section on noise) on the materials from: *Financing EU Accession in Environment: A Guidebook and Workshop Manual for Local/Regional Authorities in Central and Eastern Europe (2001)*, The Regional Environmental Center for Central and Eastern Europe. Funded by EU PHARE – Regional Environmental Accession Project (RMES), Szentendre, Hungary.



## 1. The EU Air Legislation

### 1.1 Introduction

Air pollution has been one of Europe's main political concerns since the late 1970s. A series of directives has been introduced to cut emissions of certain pollutants and to monitor their concentrations in ambient air. *The Air Framework Directive* is a key element of the EU strategy for improved air quality. It imposes strict monitoring requirements for 13 pollutants as well as the duty to prepare action plans to deal with poor air quality. The specific provisions relating to particular pollutants are included in its related *daughter* directives.

### 1.2 The Air Framework Directive and its Daughter Directives

#### 1.2.1 GENERAL OVERVIEW

The Air Quality Framework Directive sets a general policy framework for dealing with air ambient quality. Instead of looking first at the sources of the pollution, the Directive looks at the effects of the air pollution on human health and environments, and then shifts the focus to those sources that contribute the most to the effects.

The Directive sets out an EU-wide system for setting binding air quality objectives for specific pollutants to protect human health and environment. It

- requires member states to put in place systems for assessing the quality of the ambient air based upon common methods and criteria.
- requires member states to maintain ambient air quality where it is good and improve it in other cases, by means of plans and programmes of action.
- lays down provisions for a system of gathering, reporting and publicising information. This includes both data to be reported to the European Commission and information to be disseminated to the public.

The Directive focuses on air ambient quality with respect to the following thirteen pollutants:

1. Sulphur dioxide	8. Carbon monoxide
2. Nitrogen dioxide	9. Poly-aromatic hydrocarbons
3. Fine particulate matter such as soot	10. Cadmium
4. Suspended particulate matter	11. Arsenic
5. Lead	12. Nickel
6. Ozone	13. Mercury
7. Benzene	

In order to regulate their concentrations in the ground level atmosphere, the Directive introduces the following definitions:

**Alert threshold** - a concentration beyond which there is a risk to human health from brief exposure and at which immediate steps shall be taken.

**Limit value** - a concentration fixed on the basis of the scientific knowledge with the aim to protect human health and the environment. The limit value is to be attained within a given period and, once attained, must not be exceeded.

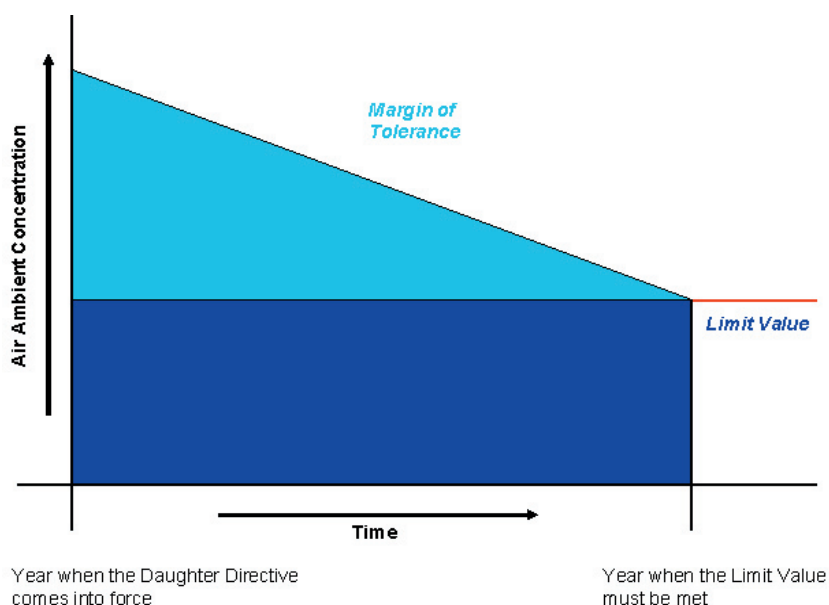
In simple terms we may say that alert thresholds are used for emergency planning, whereas limit values represent longer terms goals.



There may be cases where actual concentrations (of some of the thirteen pollutants regulated by the Framework Directive) are so high that the limit values cannot be met immediately. In such cases, the Directive allows to use a margin of tolerance, allowing for higher concentrations initially and specifying a deadline for meeting the limit values.

**Margin of tolerance** - percentage of the limit value by which the limit value may be exceeded, subject to the conditions laid down in this Directive.

Figure 1: Relationship between limit value and margin of tolerance.



As the Directive establishes “only” a policy framework, the Directive is in practice used through its Daughter Directives.

In the air sector, **Daughter Directives** are pollutant specific Directives, which for the given pollutant set the alert thresholds, limit values and deadlines for them. They also lay down the criteria and techniques for measurement of pollution concentrations, including a minimum number of sampling points.

In simple terms, any pollutant mentioned in the Framework Directive becomes regulated only after the specific Daughter Directive is adopted for it.



In practice, the Framework Directive should be always read and interpreted with the appropriate Daughter Directive(s).

### **1.2.2 IMPLEMENTATION REQUIREMENTS FOR MUNICIPAL AUTHORITIES**

The local authorities play an important role in planning and informing the public.

#### ***INFRASTRUCTURE NEEDS***

The only infrastructure required by the Directive (without respect to the specific Daughter Directives) is the proper monitoring network. In most (if not all) candidate countries, the monitoring network will be set up at the national level and will not require investment by local authorities.

#### ***PLANNING AND STRATEGY PREPARATION***

The exact implementation requirements will depend on the definition of competent authorities by candidate countries. However, it is probable that local authorities will have responsibility for the following:

- Plans and programmes to achieve the pollutant limit values.
- Preparation and execution of measures to inform the public and to improve the situation when alert thresholds are exceeded.

#### ***PUBLIC PARTICIPATION REQUIREMENTS***

The exact implementation requirements will depend on the definition of competent authorities. Consequently, with respect to the section above, the public participation principle will have to be applied to the following activities:

- Plans and programmes to achieve the pollutants limit values – the identification and acceptance of priority measures to be taken to achieve the limit values will require a broader consensus among the key stakeholders, including the public.
- Measures to inform the public and to improve the situation when alert thresholds are exceeded – the identification and acceptance of priority measures to be taken as well as the identification of effective ways how to inform will require a broader consensus among the key stakeholders, including the public.

**Activity 1****Identification of non-compliant situations in the air sector relevant to municipal authorities**

Critically analyse whether your authority should undertake a further assessment of the compliance with main EU requirements in the air quality sector. To do so, answer the questions provided below. If your authority is likely to be appointed as a competent authority for the Air Framework Directive, and/or most of the answers are “No” and/or “I do not know”, consider following up this activity. The specific EU air quality requirements and further information are available on the EC website <http://europa.eu.int/comm/environment/air/ambient.htm> and in your national ministry of environment, regional environmental authorities and other institutions with links to the EU.

1. Is your authority appointed as a competent authority for the Air Quality Framework Directive?
2. Has the zoning system been established in your country? If so, is the zone to which your city belongs an agglomeration?
3. Has the initial ambient air quality assessment taken place?
4. Is the regular measurement of the ambient air quality mandatory for your zone (region)?
5. What is the pollution level in your region/zone compared to the limit values, margins of tolerance and alert threshold from the Daughter Directives?
6. Based upon the pollution level, would establishment of the plan/programme for achieving the limit values be obligatory for your zone (region)?

## 2. The EU Water Legislation

### 2.1 Introduction

Water is one of the most comprehensively regulated areas of EU environmental legislation. This description concentrates on three directives which are most relevant for local authorities:

- the Water Framework Directive, 2000/60/EC;
- the Urban Wastewater Treatment Directive, 91/271/EEC;
- the Drinking Water Directive, 98/83/EC.

### 2.2 The Water Framework Directive

#### 2.2.1 GENERAL OVERVIEW

The Water Framework Directive

- sets out a system to protect all waters, i.e. surface and groundwater, freshwaters, and coastal waters, against pollution of any type, and to avoid deterioration of both the quality and quantity of waters.
- promotes sustainable water use in member states by requiring a progressive reduction of discharges to water over the long term.
- requires member states to take actions to mitigate the effects of floods and droughts.
- requires member states to follow the principle of cost-recovery in the provision of water supply, sewerage, and wastewater treatment services, i.e. “getting the prices right”.
- lays down provisions for reporting to the European Commission and the public, and increasing public involvement in water management.

The Water Framework Directive contains the following fundamental principles:

- high level of protection;
- precautionary principle (pollution prevention);
- rectification of pollution at the source (trying to minimise “end-of pipe” solutions);
- Polluter Pays Principle;
- integration of environmental protection into other Community Policies – e.g. agriculture, transport and energy.

Another key concept of this Directive is water management based on river basin districts.

The use of river basins to determine boundaries for water protection is an effective way to address water pollution problems. Water pollution spreads naturally throughout a river basin, but not through other geographical or political regions.



The following is an indicative list of the main pollutants for which water quality is measured under this Directive:

1. organohalogen compounds and substances which may form such compounds in the aquatic environment;
2. organophosphorus compounds;
3. organotin compounds;
4. substances and preparations with carcinogenic or mutagenic properties;
5. persistent hydrocarbons and persistent and bioaccumulable toxic substances;
6. cyanides;
7. metals and their compounds;
8. arsenic and its compounds;
9. biocides and plant protection products;
10. materials in suspension;
11. substances which contribute to eutrophication (in particular, nitrates and phosphates);
12. substances which have an unfavourable influence on the oxygen balance.

### **2.2.2 IMPLEMENTATION REQUIREMENTS FOR LOCAL AUTHORITIES**

Most of the obligations covered by this Directive relate to actions to be taken by the present and future Members of the EU at the central government level – such as creation of the relevant legislation and administrative structures. County and local authorities, even if not designated as “the appropriate competent authority”, will have to cooperate in close terms with higher-level administration. Some activities will have to be initiated and/or controlled within the jurisdiction of local/county authorities – this is specifically related to the construction of wastewater treatment plants and sewer networks and to water pricing policies. Measures designed to meet the prescribed water quality standards and abstraction limits will imply local action.

### ***INFRASTRUCTURE NEEDS***

This Directive does not contain any descriptions of technical infrastructure required for compliance. Such provisions are covered by the set of corresponding Directives. The member states must also be aware that existing monitoring infrastructure will have to be assessed and, if necessary, expanded and/or upgraded to ensure compliance with the Directive.

### ***PLANNING AND STRATEGY PREPARATION***

Preparation of river basin management plans constitutes the main planning/strategising requirement for the Water Framework Directive. Local and regional authorities should be prepared to follow the measures established in these plans. Therefore, any municipal or regional strategic and financial plans should take into account the provisions resulting from river basin management plans, as designed by the relevant authorities.

River basin management plans may be supplemented with more detailed programmes and management plans for sub-basin, sector, issue, or water type, to deal with specific aspects of water management. Local/county authorities could participate in designing such programmes.



### ***PUBLIC PARTICIPATION REQUIREMENTS***

Article 14 of the Directive requires the active involvement of all interested parties in the river basin management plans, in particular in the process of preparation, review and updating the plans.

- For each river basin, the member states should publish and receive comments to the plans.
- A timetable and work programme for the preparation of the plan should be made available three years before the beginning of the period to which the plan refers.
- An interim overview of the significant actions should be made available at least two years before the period to which the plan refers.
- Draft copies of the plan should be circulated one year before the period to which the plan refers.
- County and local authorities (both governmental and self-governmental) will have at minimum a consulting role during the process of the creation of the river basin management plans. They should also provide information to the local communities (in accordance e.g. with the Directive 2003/35/EC providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC). They may be assigned an intermediary role in gathering comments from the public, depending on institutional arrangements undertaken by each member state.



## Activity 2

### Identification of non-compliant situations related to requirements of the Water Framework Directive that are relevant to local authorities

Critically analyse whether your municipal authority should undertake a further assessment of the compliance with main EU requirements in the water sector. Since there are two more exercises related to the water sector (wastewater and drinking water included in the subsequent sections), consider the overall results for the assessment of your municipality's performance. First, answer the questions provided below. Despite the fact that many of the requirements provided by the Water Framework Directive will be within the responsibility of the central government or river basin authorities, consider assuming an active role in the planning and consultative process in the development of the river basin plans. This will help you in the implementation of municipal actions within the river basin management plan. If most of the answers are "No" and/or "I do not know", consider following up this activity. The specific EU water requirements and further information are available on the EC website <http://europa.eu.int/comm/environment/water/index.html> and in your national ministry of environment, regional environmental authorities and other institutions with links to the EU.

1. Are river basins and sub-basins identified in your country?
2. Are relevant authorities appointed to manage the water quality in river basin districts? If not, can the existing water management structure be converted to meet the requirements of the Directive, or will a completely new structure be needed?
3. Are there any water management plans in river basins ready or under preparation?
4. Are there enough control and monitoring units to check the quality of water in your area of jurisdiction?
5. Can all waters within your area of jurisdiction be described as waters of good ecological and chemical status according to the standards set in the Framework Directive and in other pieces of the EU water-related legislation?
6. If the answer to the above question is negative, does the quality of surface and groundwater comply with existing state and local regulations?
7. Are waters within your jurisdiction of good quantitative status?
8. Is the information on the state of waters freely available to the public? Are water management plans, if they exist, submitted to the public consultation process?



## 2.3 The Urban Wastewater Treatment Directive

### 2.3.1 GENERAL OVERVIEW

The *Urban Wastewater Treatment Directive* aims at preventing environmental damage done through the discharge of urban wastewater and wastewater from industrial processes. It requires that, in the majority of cases, local authorities (above 2,000 population equivalent [p.e.]) provide for sewerage systems for collecting wastewater and make sure that sewerage discharges meet certain standards.

Regarding the standards, the general rule is that secondary (biological) treatment is required for all areas except those defined as sensitive areas, as required by the Directive. In sensitive areas, tertiary treatment with enhanced removal of nutrients must be applied. In certain areas, mainly coastal and marine areas, primary treatment may be sufficient.



The main objective of this Directive is to protect the environment against adverse effects of wastewater discharges. This should be achieved through the application of the executive goals:

- ensuring that appropriate technical infrastructure (i.e. wastewater treatment plants and sewerage systems) exists so that urban wastewater is appropriately treated prior to discharge to the receiving waters;
- establishing emission limit standards for the concentration of the specific substances in urban wastewater discharges as well as for discharges from certain industrial sectors.

Principal Definitions:

**Agglomeration** – an area where the population and/or economic activities are sufficiently concentrated for urban wastewater to be collected and conducted to an urban wastewater treatment plant or to a final discharge point.

**Appropriate treatment** – treatment of urban wastewater by any process and/or disposal system, which after discharge allows the receiving waters to meet the relevant quality objectives and the relevant provisions of this and other Community Directives.

**Population equivalent (p.e.)** – organic biodegradable load having a five-day biochemical oxygen demand (BOD<sub>5</sub>) of 60 g of oxygen per day.

**Sensitive areas** – receiving waters endangered by the process of eutrophication (enrichment of water by nutrients, especially compounds of nitrogen and phosphorus, causing an accelerated growth of algae which may result in prevention of light penetration and disturbance to the balance of organisms present in the water); Annex II to the Directive indicates criteria for establishing sensitive areas.

The Urban Wastewater Treatment Directive is one of the most challenging and expensive pieces of the EU environmental acquis. Therefore, it is one of the most problematic Directives for enforcement in the candidate countries, and in most cases long transition periods have been requested.



### **2.3.2 IMPLEMENTATION REQUIREMENTS FOR LOCAL AUTHORITIES**

The provision of water services, including wastewater treatment, in most countries is the responsibility of local authorities. These authorities are usually responsible for the construction of wastewater treatment facilities; therefore it is very important that the local/regional authorities get involved, as soon as possible, in the process of planning and executing the infrastructure-related provisions of this Directive.

#### ***INFRASTRUCTURE NEEDS***

The Directive requires member states to provide specific wastewater treatment infrastructure within the following deadlines (Article 3):

- By the end of 1998, sewerage systems for waste collection and wastewater treatment plants containing tertiary treatment facilities should be provided in all agglomerations situated in sensitive areas with a population equivalent (p.e.) of more than 10,000.
- By the end of 2000, sewerage systems for waste collection and wastewater treatment plants should be provided in all agglomerations with a p.e. of more than 15,000; also appropriate treatment for discharges from the agro-food industry should be ensured.
- By the end of 2005, sewerage systems and wastewater treatment for all the other agglomerations covered by the Directive should be provided (agglomerations between 2,000 and 10,000 p.e. for sensitive areas, and 2,000 – 15,000 p.e. for other areas).

The tables below list the basic standards for wastewater quality to be achieved according to the basic areas and to sensitive areas.

Parameter	Concentration	Minimum percentage of reduction in relation to the load of the effluent	Reference method of measurement
BOD <sub>5</sub> at 20°C without nitrification	25 mg/l O <sub>2</sub>	70-90; 40 in mountain regions; over 1500 m over the sea level	Homogenised, unfiltered, undecanted sample. Determination of dissolved oxygen before and after five-day incubation at 20°C in complete darkness. Addition of a nitrification inhibitor.
COD	125 mg/l O <sub>2</sub>	75	Homogenised, unfiltered, undecanted sample. Potassium dichromate.
Total suspended solids	35 mg/l – optional requirement 35 for more than 10,000 p.e. 60 for 2,000 – 10,000 p.e.	90 – optional requirement 90 for more than 10,000 p.e. 70 for 2,000 – 10,000 p.e.	Filtering of a representative sample through a 0,45 µm filter membrane. Drying at 105°C and weighing. Centrifuging of a representative sample for at least five minutes with mean acceleration of 2,800 to 3,200 g, drying at 105°C and weighing.

Table 1: Requirements for discharges from urban wastewater treatment plants

The values for concentration or for the percentage of reduction shall apply.

Parameters	Concentration	Minimum percentage of reduction in relation to the load of the effluent	Reference method of measurement
Total phosphorus	2 mg/l P (10,000 – 100,000 p.e.) 1 mg/l P (more than 100,000 p.e.)	80	Molecular absorption spectrophotometer
Total nitrogen	15 mg/l N (10,000 – 100,000 p.e.) 10 mg/l N (more than 100,000 p.e.);	70-80	Molecular absorption spectrophotometer

Table 2: Requirements for discharges from urban wastewater treatment plants to sensitive areas that are subject to eutrophication

One or both parameters may be applied depending on the local situation. The values for concentration or for the percentage of reduction shall apply.

In cases where construction of the collecting systems for urban wastewater would produce no environmental benefit or would entail excessive costs, individual systems or other appropriate systems may be used, provided they achieve the same level of environmental protection.



The design, construction and maintenance of the collecting systems should be undertaken in accordance with the best technical knowledge not entailing excessive costs. The Directive is neutral on the issue of ownership of wastewater infrastructure. Ownership schemes differ across the member states.

### ***PLANNING AND STRATEGY PREPARATION***

Regarding the candidate countries, negotiations with the EU led to specific requirements regarding implementation programmes; local and regional authorities should get informed on the formulation of such programmes by the relevant state-level authorities.

A member state may decide that the provisions binding for sensitive areas will be applied over all its territory. This obligation relates of course also to candidate countries. It can be expected that in many cases the decision on designation of the whole country area as sensitive shall be taken (e.g. in cases where the majority of rivers drain to the reservoir where high level of eutrophication is observed). Local authorities should get informed on the status of this crucial issue.



### ***PUBLIC PARTICIPATION REQUIREMENTS***

Bi-annual reports on the disposal of urban wastewater and sludge should be made available to the public. It should also be borne in mind that the Directive 2003/35/EC providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC requires that any information related to environment held by public bodies is to be made available to any interested party on request.



### Activity 3

#### Identification of non-compliant situations in the wastewater sector relevant to municipal authorities

Critically analyse whether your authority should undertake a further assessment of the compliance with main EU requirements in the wastewater sector. To do so, answer the questions provided below. Since your authority will be most likely responsible for the compliance with those requirements, it is a crucial sector for a detailed assessment. If most of the answers will be “No” and/or “I do not know”, consider further follow-up of this activity. The specific EU water requirements and further information are available on the EC website <http://europa.eu.int/comm/environment/water/index.html> and in your national ministry of environment, regional environmental authorities and other institutions with links to the EU.

1. If the area under your jurisdiction is below 2,000 p.e. or in case of coastal areas, below 10,000 p.e., are wastewater discharges subject to “appropriate treatment” according to the definition of the Directive?
2. If the area under your jurisdiction is above 2,000 p.e., does a collection system for urban wastewater exist and does it allow to collect all urban wastewater and channel it to the wastewater treatment plant?
3. Are there wastewater treatment plants in your area? If yes, do the standards of wastewater treatment comply with the requirements set in the Directive?
4. If the sewerage and wastewater treatment system is not sufficient for treating urban wastewater from the whole area, are there adequate plans to comply according to the deadlines set in the negotiation position and implementation plan for the future compliance with Directive?
5. Does the ban on disposal of sewage sludge to surface waters exist in your area?
6. Are industrial discharges subject to a prior authorisation regime?
7. Are all the plants of the agro-food industry discharging over 4 000 p.e. and listed in Annex III of the Directive identified in your area and do they comply to the pre-treatment requirements of the Directive?
8. Does the administrative system of authorisation, enforcement and monitoring work well in your area; is there enough qualified staff and appropriate equipment in place?
9. Is the system of data collection in place and is the data on disposal of urban wastewater and sludge transferred to higher-level authorities? Is such data easily accessible by the public?

## 2.4 The Drinking Water Directive

### 2.4.1 GENERAL OVERVIEW

The Drinking Water Directive establishes strict quality standards for drinking water at the tap. It requires local authorities to

- meet the strict quality standards for water destined for human consumption;
- monitor the organoleptic (relating to the way the water smells, tastes and looks) and microbiological quality of drinking water;<sup>7</sup>
- and provide information to the public on the quality of drinking water.

In order to meet the new strict drinking water quality standards, local authorities will have to ensure suitable treatment of drinking water. The major types of drinking water treatment technologies include:

- *disinfection* (e.g. chlorination or ultraviolet radiation), to kill disease-causing micro-organisms, such as viruses, bacteria and some parasites;
- *organic removal* (e.g. aeration), for the removal of organic contaminants such as pesticides and solvents;
- *inorganic contaminants removal* (e.g. coagulation and settling), for the removal of inorganic contaminants such as cadmium, chromium, arsenic, silver and lead.

### 2.4.2 IMPLEMENTATION REQUIREMENTS FOR LOCAL AUTHORITIES

The provision of drinking water that is safe for human health in most cases lies within the scope of responsibility of the local authorities. They may be responsible for the construction of water mains and other facilities for the provision of water for human consumption. Article 10 of the Directive sets the obligation to ensure that neither substances nor impurities associated with materials for new installations remain in water intended for human consumption as they reduce the protection of human health.

#### **INFRASTRUCTURE NEEDS**

The Directive does not contain any specific descriptions of technical infrastructure required for compliance. Some other Directives, which are to be implemented in parallel, focus on infrastructure requirements necessary for ensuring the good quality of water through the prevention of pollution discharges into the waters. Member states should be aware that the monitoring infrastructure will have to be adjusted and, if necessary, additionally equipped so as to ensure adequate check if the water quality is consistent with the relevant standards set in the Directive.

<sup>7</sup> Aluminum (necessary only when used as flocculant); ammonium; colour; conductivity; *Clostridium perfringens* (including spores) (necessary only if the water originates from or is influenced by surface water); *Escherichia coli* (*E. coli*); hydrogen ion concentration; iron (necessary only when used as flocculant); nitrite (necessary only when chloramination used as a disinfectant); odour; *Pseudomonas aeruginosa* (necessary only in the case of water offered for sale in bottles or containers); taste; colony count 22 C and 37 C (necessary only in the case of water offered for sale in bottles or containers); coliform bacteria; turbidity.

**PLANNING AND STRATEGY PREPARATION**

- Member states should decide whether to exempt any categories of water from the provisions of the Directive (Article 3).
- Member states should also decide whether to provide for any derogation from the parametric values listed in the Directive.
- Competent authorities (possibly regional and local authorities, depending on the specific arrangements to be decided by the member states) shall establish appropriate monitoring programmes in accordance with the detailed requirements regarding parameters and frequency of sampling listed in Annex II and establishing methods of analysis in accordance with Annex III.

A crucial issue at the planning stage is the choice of a competent authority or authorities and identification of the stakeholders. The role of local/regional authorities as well as of water supply companies has to be clearly defined. A strong inspection and monitoring network will be necessary to ensure compliance. Health authorities and consumer associations may need to be involved in both planning and implementation of the Directive's requirements. Therefore, good practice indicates that a broad consultation process should be undertaken at the planning stage.

**REPORTING**

- Member states shall publish a report every three years on the quality of water intended for human consumption, with the objective of informing the consumers and the Commission (Article 13).
- The member states are additionally obliged to report to the Commission on
  - ⇒ cases of derogation from the requirements of the Directive;
  - ⇒ requests for an extension of time for implementation;
  - ⇒ measures taken to comply with the Directive;
  - ⇒ transposition to the national law.

**PUBLIC PARTICIPATION REQUIREMENTS**

Public participation provisions in this Directive are mostly related to provisions of adequate information. Consumers should receive information about the quality of water intended for drinking purposes. They should also be informed promptly in cases where the supply of drinking water constitutes a potential danger for human health.

Although the provision of water, which may cause health risks to users, is prohibited, there may be cases of failure to meet the prescribed standards. In such circumstances competent authorities should advise the consumers of any possible remedial action they could take to avoid risk.



<sup>8</sup> 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

##### Identifying non-compliant situations in the drinking water sector relevant to municipal authorities

Critically analyse whether your authority should undertake a further assessment of the compliance with main EU requirements in the drinking water sector. To do so, answer the questions provided below. Since your authority will be most likely responsible for the compliance with those requirements, it is a crucial sector for a detailed assessment. If most of the answers will be “No” and/or “I do not know”, consider further follow-up to this activity. The specific EU water requirements and further information are available on the EC website <http://europa.eu.int/comm/environment/water/index.html> and in your national ministry of environment, regional environmental authorities and other bodies with links to the EU.

1. Are all points of individual supply of water intended for consumption identified within your area of competence?
2. Is there a sufficient institutional set-up in place to carry out appropriate monitoring of water intended for human consumption?
3. Are there any monitoring programmes formulated for checking the quality of drinking water?
4. Is all water intended for human consumption in compliance with the national/local quality standards? Are these standards different from the ones listed in Annex I to the Directive?
5. Is information about the quality of drinking water provided to the consumers? Is there a procedure of informing the consumers on danger related to poor quality of drinking water in cases of failure to meet the prescribed standards in place?



### 3. The EU Waste Legislation

#### 3.1 Introduction

The key requirements of EU waste legislation are presented below. Emphasis is put on two key directives:

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

#### 3.2 The Framework Directive on Waste

##### 3.2.1 GENERAL OVERVIEW

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” Directives<sup>8</sup> setting requirements and guidelines for dealing with specific types of waste (packaging waste, sewage sludge, hazardous waste, batteries, PCB, tyres and waste oils). The Daughter Directives specify also methods for waste treatment and disposal (landfilling and incineration). The FDW provides a common definition of waste across the 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 Directive establishes a waste management hierarchy, which stipulates 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

- re-use of waste;
- recycling of waste;
- recovery of waste;
- use of waste as source of energy;
- incineration without energy recovery;
- landfilling.

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



##### 3.2.2 IMPLEMENTATION REQUIREMENTS FOR LOCAL AUTHORITIES

Most of the implementation responsibilities are levied on the national authorities. Although the Directive does not specifically require that member states delegate solid waste management responsibilities to local authorities, this will continue to be the practice in most candidate countries.

It is therefore important for local authorities to understand the requirements of the Framework Directive, particularly in relation to infrastructure needs, planning and strategy preparation, and public participation requirements.

### ***INFRASTRUCTURE NEEDS***

The member states are responsible for the establishment of an integrated and adequate network of waste disposal and treatment installations. The waste installations should reflect the best available technology not entailing excessive costs. The network of installations should serve the purpose of self-sufficiency in waste disposal, and it should reflect the principles of waste management.

The member states are responsible for carrying out an assessment of 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***

The Directive obliges member states to prepare waste management plans following the establishment of an integrated waste management strategy, based on the principles incorporated in the Directive. The Directive calls for strategies and waste management plans at the national level, and no reference is made to waste management plans at the regional or local level. However, it is a good practice that the preparation of municipal or regional waste management plans follows the philosophy of waste management incorporated in the Directive.

### ***PUBLIC PARTICIPATION REQUIREMENTS***

No requirements for public participation specifically addressed to local authorities are stipulated in the Directive. The formal requirements for mandatory public consultation are related mostly to siting procedures for new waste disposal/treatment facilities. These are, however, ruled by the land use permitting system and the Environmental Impact Assessment legislation.

In addition, it is a good practice to involve civic Organisations in drawing the National (and Regional/Local) Waste Management Plans; though the Directive does not specifically require this.



### Activity 5

#### Identification of non-compliant situations related to the Waste Framework Directive that are relevant to local authorities

Critically analyse whether your authority should undertake a further assessment of the compliance with the main EU requirements related to the Waste Framework Directive. To do so, answer the questions provided below. Since your authority will be most likely responsible for the incorporation of the above mentioned waste management principles into waste management policy and practices, it is a crucial sector for a detailed assessment. If most of the answers will be “No” and/or “I do not know”, consider further follow-up of this activity. The specific EU waste requirements and further information are available on the EC website <http://europa.eu.int/comm/environment/wasteinc/html> and in your national ministry of environment, regional environmental authorities and other bodies with links to EU.

1. Has a Municipal Solid 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)?
2. Has an assessment been made to establish whether the existing waste disposal/treatment installations do not create risk to the air, water or soil, or a nuisance in the form of odours or noise?
3. Are the existing waste disposal/treatment facilities sufficient in addressing the principle of best available technology not entailing excessive costs, and the waste management hierarchy stipulated in the Directive?
4. Are the waste management companies operating in the municipal area granted operating permits?

### 3.3 The Directive on the Landfill of Waste

#### 3.3.1 GENERAL OVERVIEW

The main goal of the *Directive on the Landfill of Waste* is to reduce the amount of waste subject to landfilling. Nevertheless, the landfills will continue to be an important part of the waste management infrastructure. Many of the existing landfills will have to be upgraded or closed and replaced with new ones which fulfil the basic EU legislation technical and management requirements:

- In addition to a geological barrier, provision where appropriate must be made for a leachate sealing and collection system, as described in the Directive. Requirements will vary depending on the risk of leachate to the environment and groundwater resources.
- Landfill gas must be collected from all sites receiving biodegradable waste. Gas must be flared if it cannot produce energy.
- Measures must be taken to minimise impacts from odour and dust, noise and traffic, birds, vermin and insects, formation of aerosols and fires.
- Measures must be taken to ensure the stability of the mass of waste and associated structures, and secure the site with fencing.
- Certain types of waste, such as tyres, healthcare, flammable and liquid wastes may not be accepted in landfills and they will require separate facilities for disposal.
- Co-disposal will no longer be permitted and special landfills will be required for hazardous waste.
- Monitoring of a range of parameters is required (including post-closure monitoring).

#### 3.3.2 IMPLEMENTATION REQUIREMENTS FOR LOCAL AUTHORITIES

Waste management is one of the major responsibilities of local authorities. It is therefore foreseeable that the obligations to comply with the provisions of the Directive on Landfill will be shifted to a large degree to local and county authorities.

It is expected that ultimately local authorities will have to take the following measures in relation to the Directive on Landfill:

##### **INFRASTRUCTURE NEEDS**

The Directive has a number of infrastructure implications. They relate particularly to technical standards for landfills, and targets for the reduction of biodegradable waste sent to landfills. The key requirements include:

- Waste should be treated before landfilling – hence various waste treatment facilities need to be built (the selection of facilities is in the discretion of the competent authorities but it should 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 need to be provided to comply with this requirement (this relates for instance to batteries, medicines, electronic waste).

- Disposal of tyres, healthcare wastes, flammable and liquid waste is no longer allowed at landfills. Separate collection systems and treatment/disposal facilities need to be put in place to redirect these types of waste from disposal at landfills.
- Methane from existing and new landfill sites has to be collected and flared off if it cannot be used for energy generation. Methane collection and utilisation systems need to be put in place in all existing landfills and proposed landfill sites.
- A leachate collection system and treatment facility must be provided at all landfills. Leachate collection systems and leachate treatment plants need to be put in place in all existing landfills and proposed landfill sites.
- Composting facilities are required to achieve reduction targets for landfilling of biodegradable waste.

### ***PLANNING AND STRATEGY PREPARATION***

The central government is required to develop strategy to achieve reduction targets for biodegradable waste sent to landfills. It is likely that the government will task local authorities with the preparation of similar plans at the local level.

Operators of existing landfill sites should prepare conditional plans for the sites. The conditional plans will assist the competent authorities to determine whether existing sites may continue to operate or whether they should be refused permit to continue to operate.

### ***REPORTING***

The reporting requirements of this Directive are relatively complex. Member states must report on the implementation of the Directive to the Commission at intervals of three years, based upon a questionnaire or outline drafted by the Commission. Reporting will require member countries to gather data on the types and proportions of waste going to landfill; the origins and producers of waste; hazardous waste landfilling; and others. Systems and databases will need to be prepared for reporting, and local authorities will likely be required to ensure that landfill operators report the data.

### ***PUBLIC PARTICIPATION REQUIREMENTS***

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



### Activity 6

#### Identification of non-compliant situations related to landfilling of waste relevant to local authorities

Critically analyse whether your authority should undertake a further assessment of the compliance with main EU requirements related to landfilling of waste. To do so, answer the questions provided below. Since your authority will be most probably responsible for the incorporation of the waste landfilling requirements into waste management practices, it is a crucial sector for a detailed assessment. If most of the answers will be “No” and/or “I do not know”, consider further follow-up of this activity. The specific EU waste requirements and further information are available on the EC website <http://europa.eu.int/comm/environment/wasteinc/html> and in your national ministry of environment, regional environmental authorities and other bodies with links to the EU.

Do the landfill sites under your jurisdiction (and consequently the operational permit) comply with the technical requirements of the Directive on Landfill?

Check in particular:

- Methane collection and utilisation system.
- Leachate collection and treatment system.
- Appropriate fencing of the landfill sites.
- Is waste treated prior to disposal at landfill?
- Is waste landfilling the only method of waste disposal in your municipality?
- Is co-disposal of municipal waste and hazardous waste permitted in the landfill sites under your jurisdiction?
- Are tyres, healthcare waste, flammable and liquid waste disposed at the landfill sites under your jurisdiction?
- Is composting of biodegradable waste undertaken in your municipality?
- Is the cost of closure, management and after-care included in the landfill fee?
- Is regular monitoring of the types and quantities of waste undertaken at the landfill sites under your jurisdiction? Are regular reporting arrangements established?

## 4. The EU Noise Legislation

### 4.1 Introduction

Environmental noise is one of the serious local environmental problems and the source of a large number of complaints from the public. However, until recently, the noise problems have had lower priority when compared with air, water or waste sectors at the EU level, as well as in many European countries.

The Community environmental noise policy consisted of legislation setting maximum sound levels for vehicles, aeroplanes and machines. Owing to this legislation and technological progress significant reductions of noise from individual sources have been achieved. However, this did not really lessen the problems resulting from exposure to environmental noise, especially road traffic noise.

The 1993 Fifth Action Programme of the EU made an attempt to address the issue and included a number of basic targets for noise exposure to be reached by the year 2000. However, it was only the Green Paper on Future Noise Policy that was the first step towards the development of a noise policy with the aim that no person should be exposed to noise levels which endanger health and quality of life. Following 1996, the European Commission developed a new framework for the noise policy – *the Directive on Environmental Noise* 2002/49/EC.

### 4.2 The Directive on Environmental Noise

#### 4.2.1 GENERAL OVERVIEW

The new *Directive on Environmental Noise* provides a framework based on shared responsibility involving target setting, monitoring of progress and measures to improve the accuracy and standardisation of data to help improve the coherency of different actions between member states. The Directive applies only to large cities, roads, railways, and airports (for more information see Chapter 5.2.2).

The Directive includes four elements:

- harmonisation of noise indicators and assessment methods on environmental noise<sup>9</sup>;
- collection of information about noise exposure in the form of noise maps;
- preparation of action plans;
- informing and consulting the public.

The member states will have to appoint the authorities or bodies who will be responsible for implementing the Directive, including the authorities who will draw up the noise maps and action plans.

<sup>9</sup> Environmental noise refers to noise from road traffic, railways, aircraft, and industrial plant.

The first noise maps have to be completed no later than 2007, and the first action plans no later than 2008 by EU member states. The next round of maps and action plans has to be completed five years later, i.e. in 2012 and 2013.

The action plans must contain a complete description of the measures that the relevant authorities intend to take to reduce noise pollution. A number of formal minimum requirements have been specified for the action plans, but there are no deadlines when the various initiatives in the action plans have to be implemented. They have to be reviewed and modified if necessary whenever significant changes take place which affect the existing noise situation, or at least every five years, following their completion. The specific EU noise requirements and further information should be available at the EC website <http://europa.eu.int/comm/environment/noise/home.htm>.

#### **4.2.2 IMPLEMENTATION REQUIREMENTS FOR LOCAL AUTHORITIES**

Since the Directive applies only to bigger urban areas, the municipalities who are below 100,000 inhabitants will be, in most circumstances, not subjected to this Directive. However, those ones which are above this threshold will be responsible for drawing up strategic noise maps and actions plans and ensuring public involvement and access to information on noise.

##### ***INFRASTRUCTURE NEEDS***

Member states should be aware that the monitoring infrastructure will have to be adjusted and, if necessary, additionally equipped so as to ensure adequate noise monitoring to draw noise maps. This is especially important in the context that noise maps are to be drawn up using identical methods in all the EU countries.

##### ***PLANNING AND STRATEGY PREPARATION***

- Only large cities, roads, railways, and airports are covered by the Directive. To implement the Directive, the individual member states have to draw up strategic noise maps and action plans aimed at preventing and reducing environmental noise. In the first phase, noise maps have to be drawn up for urban areas with over 250,000 inhabitants, all major roads carrying more than 6 million vehicles a year; major railways with over 60,000 rail passengers a year; and finally, the major airports. In the second phase, urban areas with over 100,000 inhabitants, all major roads carrying more than 3 million vehicles, and railways with over 30,000 rail passengers a year will also be covered.
- Action plans have to be adopted which aim to prevent and reduce environmental noise when this noise can lead to harmful effects on human health.



**PUBLIC PARTICIPATION REQUIREMENTS**

The member states have to ensure that

- the noise maps and action plans will have to be published, for example, on the relevant authorities' websites or in some other appropriate manner;
- noise maps and action plans are subject to public consultation; and
- the information about noise, on the basis of noise maps, is made available to the public.

It is expected that in many countries, national guidelines on noise maps and action plans, including public consultation, will be prepared for responsible authorities. These will provide the framework for the responsible authorities to comply with the Directive. The size of your municipality is the crucial criterion for determining future responsibilities of your city in noise management.



**APPENDIX 3****SAMPLE QUESTIONNAIRE SURVEY EXPLORING CITIZENS' SATISFACTION WITH THE MUNICIPAL WASTE MANAGEMENT SYSTEM.**

This sample questionnaire survey is designed to explore how residents perceive the environmental management and the quality of environment in a city, and find out what are the residents' recommendations for future improvements. All key stakeholders should be approached with the survey (see section 3.2 for details). It is recommended that at least 300 questionnaires are sent out to obtain a sufficient sample size. The results should be used for statistical analysis.

The responses should be indicated with 'x' in the applicable box, or by highlighting the numbers, referring to the questions in a scale from 1 (worst) to 5 (best).

1. Do you experience effects of environmental pollution?

- a) yes – often ☐
- b) yes – frequently ☐
- c) yes – sporadically ☐
- d) no – never ☐

2. How would you evaluate, in a scale from 1 (worst) to 5 (best), a state of air pollution in your town caused by:

- a) exhaust gases
- b) pollution from a power generation station
- c) coal furnaces in individual houses
- d) industrial pollution

1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5

3. Do waste collection and disposal services in your city meet your expectations?

- a) Yes – they fully meet my expectations. ☐
- b) They meet most of my expectations but some improvements are needed. ☐
- c) They meet some of my expectations but major improvements are needed. ☐
- d) No – they do not meet my expectations at all. ☐

4. Are you satisfied with the level of waste tariffs?

- a) They are excessively high. ☐
- b) They are too high. ☐
- c) They are satisfactory. ☐
- d) They are too low. ☐

5. What type of waste is especially noxious for you?
- a) household waste ☐
  - b) sewage waste ☐
  - c) illegal waste dumps ☐
  - d) industrial waste ☐
6. Do you separate solid waste?
- a) yes – often ☐
  - b) no – because there is no collection system ☐
  - c) no – because I do not know how ☐
  - d) no – I do not have the time ☐
7. How do you react when you see incidents of illegal dumping?
- a) I ignore it and pretend I have not seen it. ☐
  - b) I verbally approach the violator and say that he/she is not allowed to do that. ☐
  - c) I warn the violator that I will inform the authorities if he/she does not stop. ☐
  - d) I instantly call the authorities or the police and report the matter. ☐
8. Indicate main sources of groundwater pollution in the town (max. 2 answers)
- a) leaking sewers ☐
  - b) industrial landfill ☐
  - c) industrial waste ☐
  - d) leaking septic tanks ☐
9. Which are the main sources of surface water pollution? Assess at a scale from 1 (worst) to 5 (best)?
- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| a) rain water gutters                               | 1 | 2 | 3 | 4 | 5 |
| b) industrial wastewater                            | 1 | 2 | 3 | 4 | 5 |
| c) illegal discharge of sewage to stormwater sewers | 1 | 2 | 3 | 4 | 5 |
| d) solid waste thrown into water                    | 1 | 2 | 3 | 4 | 5 |
| e) wastewater treatment plant                       | 1 | 2 | 3 | 4 | 5 |
10. Do water services in your city meet your expectations?
- a) Yes – they fully meet my expectations. ☐
  - b) They meet most of my expectations but some improvements are needed. ☐
  - c) They meet some of my expectations but major improvements are needed. ☐
  - d) No – they do not meet my expectations at all. ☐

11. Are you satisfied with the level of drinking water and wastewater tariffs?
- a) They are excessively high. ☐
  - b) They are too high. ☐
  - c) They are satisfactory. ☐
  - d) They are too low. ☐
12. Are you satisfied with traffic management in your city?
- a) Yes – it fully meets my expectations. ☐
  - b) It meets most of my expectations but some improvements are needed. ☐
  - c) It meets some of my expectations but major improvements are needed. ☐
  - d) No – it does not meet my expectations at all. ☐
13. Are you satisfied with public transport in your city?
- a) Yes – it fully meets my expectations. ☐
  - b) It meets most of my expectations but some improvements are needed. ☐
  - c) It meets some of my expectations but major improvements are needed. ☐
  - d) No – it does not meet my expectations at all. ☐
14. What are the effects of increased road traffic?
- a) increased fumes emissions, polluted air ☐
  - b) more cancer cases, other illnesses ☐
  - c) excessive noise levels ☐
  - d) more traffic accidents ☐
  - e) other (please write down the answer) ☐
- 
15. If you could spend 100 EUR for any purpose, what would you choose from the list below?
- a) social welfare ☐
  - b) waste management ☐
  - c) river valley restoration ☐
  - d) charity ☐
  - e) other (please write down the answer) ☐
-

16. Give priorities, at a scale from 1 (lowest priority) to 5 (highest priority) to the following problems:

- a) increased fumes emissions, polluted air ☐
- b) poor water quality in the river ☐
- c) excessive noise levels ☐
- d) road traffic pollution ☐
- e) out-of-date dumpsite contaminating groundwater ☐

17. Would you be interested to get actively involved in making the Municipal Environmental Strategy for your city by attending stakeholder group meetings and/or providing input to the Strategy Working Groups?

- a) Yes ☐
- b) No ☐

We would like to thank you for completing this questionnaire and ask you to provide the additional information below (required for statistical analysis). The results of the survey will be available at the town's Internet page ..... It will also contribute to the development of the Municipal Environmental Strategy.

**AGE:**

**GENDER:**

**EDUCATION:**

**PROFESSION:**

## APPENDIX 4

### COST-EFFECTIVENESS ANALYSIS

Cost-effectiveness is one of the most important criteria for evaluating alternative strategic options. It answers the question, “How can we achieve the greatest level of environmental improvement for a given amount of money.” Cost-effectiveness involves standardising or normalising project costs by dividing costs by a common environmental indicator, such as tonnes of waste prevented or reduced, or reductions in ambient air concentrations of specific pollutants. Precautions must be taken when applying cost-effectiveness analysis to compare only control/reduction options that provide environmental improvements that are very similar.

Three key issues should be taken into account when conducting a cost-effectiveness analysis. Firstly, the existing studies may supply the necessary information on pollution control effectiveness, thus avoiding the need for additional research. Secondly, the objective of the cost-effectiveness analysis is to arrive at ranking of alternative projects or measures. Precise measurement of cost-effectiveness is often not necessary. In many cases, the pollution reduction achieved by different project alternatives may be so great as to preclude the need for extensive engineering analysis or even research of secondary literature sources. Finally, one should focus on pollutant releases and other outcomes that can be easily measured and are relevant to municipal goals.

The basic steps in conducting a cost-effectiveness analysis include:

1. *Analyse project costs*: estimate total capital (i.e. construction and equipment) and operating maintenance and replacement costs over the life-time of the facility or a project. It is useful to add any estimation of external environmental or social costs.
2. *Conduct a life-cycle cost analysis*: Life-cycle costs are the total sum of all costs associated with a particular project over a particular period of time (typically considered to be a life-cycle of a capital asset). Since life-cycle costs are incurred over an extended period of time, the analysis usually includes a consideration of how the value of money changes over time due to factors such as inflation and interest rates.
3. *Analyse project benefits*: Determine the pollution reduction resulting from the project or other environmental benefits that can be expressed in physical units.
4. *Analyse the cost-effectiveness by standardising cost measures*: Determine the costs per unit of pollution control achieved by dividing the annual costs by the annual pollution reduction expected to be achieved.

*Source: Financial Capability Guidebook (1984). U.S. Environmental Protection Agency, Office of Water, Washington DC, USA.*

## APPENDIX 5

### COST-BENEFIT ANALYSIS

Improvement of environmental conditions and services in a municipality is costly. Usually, the financial resources available are scarce and insufficient to cover all needs of the MES. Consequently, it is important to evaluate how the available funds can be used in the most effective manner. A useful decision support tool enabling a comparison of strategic alternatives is the *Costs-Benefits-Analysis* (CBA). In the CBA, the benefits are all positive consequences of planned activities, whilst the costs are the opposite of benefits, i.e. all negative consequences. This method can be applied if it is feasible to put monetary values on both costs and benefits of the analysed action.

The CBA is generally an expert method. The methodological difficulty with the CBA relates to the scope of cost and benefit assessment. In particular, the so called environmental and social *externalities* may significantly alter the results of a CBA being at the same time difficult to quantify in monetary terms. For instance, cleaning up a lake brings direct economic benefits in terms of an increased number of tourists and the provision of good quality water supply etc. In addition, it results in the restoration of species and habitats, improvement of amenity value, increase of property value etc. While the direct benefits are relatively straightforward to quantify, the *external* benefits are controversial to be expressed in monetary values as they involve an element of subjective judgement (e.g. the value of species, habitats or human health).

The main practical difficulty with application of the CBA is the shortage of data and information essential to determine and calculate the costs as well as estimate the benefits. In applying the CBA to making an MES, these difficulties can be avoided by using proxy data and collective knowledge. For instance, a simplified CBA could be undertaken by the MES stakeholder group under the direction of an experienced expert.

It is crucial to focus on the early stages of the CBA where the scope of the analysis is determined. A carefully scoped CBA can save much data collection and analytical effort. The key considerations of the early stages of the CBA include:

- Which costs and benefits are to be included in the analysis?
- How should the costs and benefits be measured?

The application of the CBA in making the MES should consist of four steps:

1. determining alternative solutions;
2. determining the scope and approach to calculating costs;
3. determining the scope and approach to the estimation of benefits;
4. comparing the estimated costs and benefits.

The ultimate result of the CBA is a net benefit (benefits minus costs) for a specific project/measure. The next sections describe in more detail each of the key steps of the CBA.

## **1. DETERMINING ALTERNATIVE SOLUTIONS**

In the MES, the CBA approach is usually applied to appraise and compare alternatives and choose the most feasible projects. It is important to make sure that all alternative measures are identified and described (see Chapter 8).

The CBA is usually applied to high cost investment projects or alternative scenarios (e.g. alternative solid waste management systems). Soft projects of relatively low cost aimed at awareness raising or nature conservation are usually not subject to CBA due to difficulties with the monetisation of benefits. It is also recommended not to apply the CBA to measures or projects which have been agreed and are being implemented (these should be considered as a 'given' in the MES). Alternatively, poorly defined projects which in addition required inter-municipal agreement should be subject to a CBA when they are sufficiently well defined and agreed upon.

## **2. DETERMINING THE SCOPE AND APPROACH TO CALCULATING COSTS**

The next step is to identify all costs related to the analysed measure/project. This step usually requires strong methodological and technical support by an experienced economist or CBA expert. The expert involvement is particularly important for determining the methodological approach, discounting future costs (expressing the costs in the future value of money) and estimation of external costs. The expert input is crucial if little data is available. The following cost categories should be considered:

- investment (capital) costs;
- operational costs;
- maintenance costs;
- project preparation costs (including strategies and programmes, technical concepts, engineering designs, feasibility studies etc.);
- external costs, such as temporary negative environmental impacts during the construction phase, potential loss of jobs or other social stress.

The definition of these cost categories depends on the stage of project preparation. If a technical project has been prepared for the analysed measure, then the investment costs and preliminary data on the operational and maintenance costs are likely to be available.

The assumption in the CBA should be that the analyses of costs are based on the available data and materials. The base source material may comprise conceptual documents, desk study materials and statistical data compiled by the municipal



authorities and other institutions. Proxy data can include for instance costs of similar projects completed in other cities.

However, there will often be situations where there are no available supporting documentation. In such case, an economist should be hired to undertake the costing analyses. Alternatively, proxy data and rough estimations based on collective knowledge of the MES stakeholder group could be applied. However, if this path is chosen, the accuracy and quality of the CBA is usually compromised, and the results should be verified by a specialist.

### **3. DETERMINING THE SCOPE AND APPROACH TO THE ESTIMATION OF BENEFITS**

After analysing the costs, the benefits should be estimated looking at both direct and indirect benefits. This step should also be delegated to experts though stakeholders can provide useful information on the identification of impacts and physical effects of the analysed projects/measures. Similarly to the cost estimation, the main stumbling blocks in the evaluation of benefits are often the shortage of data, the need to apply proxy data, reliance on the collective knowledge or additional surveys and data collection efforts.

Most projects generate income. For instance, each tonne of solid waste deposited in the proposed landfill will generate fees, if methane is to be recovered and turned into energy this will also generate income. These direct benefits are relatively straightforward to estimate provided the project/measure is sufficiently well formulated. However, most environmental projects generate external benefits such as improved quality of environment and biodiversity, increased amenity values or public health. The users of the environment and those who value its presence (e.g. clean river or rare habitats which may be far away from their residence), can derive specific benefits from environmental improvements. Those benefits include both *user* and *non-user* values. In environmental economics, the term “total economic value” is used to estimate the combined environmental benefits (or costs).

The starting point in estimation of the *external* benefits is the identification of the potential environmental impacts of the project/measure. Subsequently, the physical effects of those impacts should be estimated, thus the *dose-response* relationship is established linking the amount of impact with the amount of pollution. Finally, monetary values should be put on those effects.

In recent decades a number of methods have been developed to assign values to environmental benefits. The most frequently used methods include:

- the effect on production method (e.g. increased fish catch in a lake or reduced number of sick leave days);
- preventive expenditure (e.g. cleaned up water source eliminates the need to bring drinking water in tankers to a settlement);

- damage cost avoided (compared to the ‘do nothing’ option);
- human capital (e.g. improvement of the health conditions of the population and associated savings in terms of health care and increased productivity);
- property value (estimation how value of houses or land would increase due to environmental improvements);
- contingent valuation method (how people value certain environmental improvements by direct questioning, assessment of willingness to pay for environmental improvements).

The box below illustrates an exemplary approach to the evaluation of benefits associated with environmental improvements. A useful overview of various evaluation methods is provided *inter alia* in Winpenny (1991).

#### Example of evaluation of air quality improvements

**Issues identified:** effects on human health, improved visibility, reduced odor, improved productivity of some crops, reduced damage to building materials.

#### Methodological approaches:

- health effects of reduced concentration of particulate matter and SO<sub>2</sub> by calculating productivity increase through dose-response function; health treatment costs and value of saved life;
- cost estimation for reduced damage to buildings, crops and machinery through dose-response function;
- increase of amenity value calculated through willingness to pay.



### 5. COMPARING THE ESTIMATED COSTS AND BENEFITS

There are various methods that can be applied to compare costs and benefits of the analysed project, measures or alternative. This overview refers to three commonly used indicators: the *Payback Period*, the *Net Present Value* and the related *Internal Rate of Return*.

The *Payback Period* represents the amount of time essential for a project to recover the initial capital costs (outlays), from the generated financial surplus. In the CBA this is a period needed for the net benefits to equal the total investment costs.

The *Payback Period* method allows the selection of an alternative that enables the recovery of the investment capital cost over the shortest possible time. The basic advantage of this method is the simplicity of mathematical calculations that is required. This method is useful when choosing projects which bring fast benefits in the early phases of operation. Two main concerns with the *Payback Period* are that it ignores the time value<sup>10</sup> of money and expected cash-flows beyond the payback period.

<sup>10</sup> One Euro today is worth more than one Euro to be received in the future because it can be invested today to generate interest to earn more than a Euro in the future. This depends, however, upon the rate of return or interest rate which can be made on the investment.

Apart from this, the payback period only supplies information on the liquidity of a project (the pace of return), and does not measure its profitability. For example, by promoting projects generating large surpluses in a short term, the method can suggest the choice of an investment which is less profitable in a long term. This often applies to many alternative projects at the municipal level.

Other methods, dealing with costs and benefits of projects that occur in different time horizons, are based on the application of discounting techniques. The use of such techniques is a result of the assumption that the value of money changes over time. A reference can be made here to the popular saying “time is money”. In everyday decisions, we prefer solutions which bring fast income and required expenditure over a longer period of time.

This can be illustrated with the following example. By investing a certain amount of money, one could start one’s own grocery store. One would have two options, either to wait until the required sum of money is saved up, or borrow it from a bank. If one decides to go after the second option, the interest one would have to pay to a bank would be the price for satisfying the need to start the business earlier. The longer one would have to wait for income to pay back the loan, the higher the cumulative sum of interests.

A significant number of alternatives analysed in the CBA to solve environmental problems at a local level are investment projects implemented by municipal authorities as a part of local infrastructure. Municipalities often operate under severe financial restraints and cannot afford the investment projects without seeking finance from the capital market in the form of loans, bond issues, or finding a strategic investor. Taking into account the specific nature of municipal investment projects (high capital costs, long payback period), only a long-term strategy enables the rationalisation of investment processes.

The most frequently used CBA indicators based on discounting include:

- *Net Present Value method (NPV)*; and
- *Internal Rate of Return method (IRR)*.

Both the NPV and the IRR bring the flows of future costs and future benefits down to a common denominator. This is done by discounting both flows using the appropriate coefficient, with the aim of getting the current values for future costs and benefits. The coefficient (the discount rate) selected for the analysis has a key impact on the indicator value. Choosing the right rate is particularly important when analysing environmental projects. In numerous guidebooks one can find various arguments in favour of using a lower discount rate than a market one, in environmental analyses for comparisons. This is supposed to be a way of taking account of specific factors

related to the functioning of ecosystems. However, manipulating the discount rate obscures the clarity of analyses and makes the CBA more subjective.

A positive value for the NPV indicator means that the project is economically viable. The higher the NPV value the greater the net benefits of the project. The NPV indicator is usually the best method for comparing investment projects.

Inconveniences related to the necessity to precisely determine the discount rate may be minimised if the investment is appraised on the basis of the IRR. This is a discount rate for which costs and benefits are equal. The IRR indicator does not define the scale of the costs or benefits but fulfils the role of an indicator of the project's profitability. The higher the IRR ratio the more profitable is the investment.

The final element of the CBA analysis is usually the sensitivity analysis. The sensitivity analysis involves counting the costs and benefits using the alternative value of the adopted variables and assumptions. For example, one could analyse the costs and benefits taking different levels of a discount rate or assuming different waste stream deposited in a landfill site. The sensitivity analysis would make it possible to verify whether the results change significantly depending on various discount rates. If it is a case, this would imply that a discount rate or the waste stream are the critical variables.