

Modernization of local public services in the Republic of Moldova

- Intervention area 2: Regional planning and programming -



Regional Sector Program on Solid Waste Management: Development Region Centre

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Acronyms and Abbreviations

€	Euro
CPAA	Central Public Administration Authorities
RDA	Regional Development Agency
LPA	Local Public Authorities
EIB	European Investment Bank
EBRD	European Bank for Reconstruction and Development
WB	World Bank
IMC	Inter-municipal Cooperation
PPC	Possible Project Concepts
RDC	Regional Development Council
WEEE	Waste electrical and electronic equipment
RD	Regional Development
EIA	Environmental Impact Assessment
EUR	Euro
NEF	National Environmental Fund
NFRD	National Fund for Regional Development
GIZ	German Development Cooperation through GIZ
WG	Working group
SWG	Sectoral working groups
RSWG	Regional Sector Working Group
GD	Government Decision
ENPI	European Neighbourhood and Partnership Instrument
IFI	International Financial Institutions
IWTS	Improved waste transfer stations
WM	Waste Management
MRDC	Ministry of Regional Development and Constructions
SWM	Solid Waste Management
ME	Ministry of Environment
RWM	Regional Waste Management
UN	United Nations Organization
PET	Polyethylene terephthalate
GDP	Gross Domestic Product
ROP	Regional Operational Plan
RWMP	Regional Waste Management Plan
RSP	Regional Sector Program
DRC	Development Region Centre
DRN	Development Region North
REP	Extended Producer Responsibility
RM	Republic of Moldova
RDS	Regional Development Strategy
FS	Feasibility study
MBT	Mechanical biological treatment
CU	Composting units
EU	European Union
PIU	Project Implementation Unit
USAID	US Agency for International Development

Definitions

The following definitions apply for this RSP:

- **Collection** - means the gathering of waste, including the preliminary sorting and preliminary storage of waste for the purposes of transport to a waste treatment facility;
- **Separate collection** – collection where a waste stream is kept separately by type and nature so as to facilitate a specific treatment;
- **Waste** – any substance or object which the holder discards or intends or is required to discard;
- **Hazardous waste** - waste which displays one or more of the hazardous properties;
- **Disposal** - any operation which is not recovery even where the operation has as a secondary consequence the recovery of substances or energy;
- **Waste management** - collection, transport, recovery and disposal of waste, including the supervision of such operations and the after-care of disposal sites, and including actions taken as a dealer or broker;
- **Preparing for re-use** - checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing;
- **Prevention** - measures taken before a substance, material or product has become waste, that reduce the quantity of waste, including through the re-use of products or the extension of the life span of products;
- **Recycling** - any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations;
- **Recovery** - any operation whereby a material or a substance, which otherwise would be lost, is again regenerated/obtained;
- **Re-use** - any operation by which products or components that are not waste are used again for the same purpose for which they were conceived;
- **Treatment** - recovery or disposal operations, including preparation prior to recovery or disposal;
- **Waste oils** - any mineral or synthetic lubrication or industrial oils which have become unfit for the use for which they were originally intended;
- **Recovery** - any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy;
- **Waste electrical and electronic equipment (WEEE)** - electrical and electronic equipment that are waste, including all components, substances and consumables which are an integral part of the product, when it becomes waste;
- **Construction and demolition waste** - inert waste resulting from demolition or construction of buildings, represented by mineral debris originating from demolition or construction, reconstruction, repair and arrangement of buildings, roads

and other civil or industrial structures, excavation of foundations and other, which are not classified as hazardous waste according to the legal provisions in force;

- **General hazardous household waste** - waste which displays one or more of the hazardous properties listed in EU directives concerning waste;
- **Sanitary landfill** – waste disposal site for storage of waste on or under the ground, meeting the requirements of EU directive concerning waste;
- **Municipal waste** - waste from households, as well as other waste which, because of its nature or composition, is similar to waste from household;
- **Biodegradable waste** - waste which can undergo anaerobic or aerobic decomposition, such as food and garden waste, paper and paperboard;
- **Street waste** - waste specific to public traffic routes that originate from everyday activity of the population, from landscaping, animals, deposition of solids in the atmosphere;
- **Bulky waste** - waste types of different origin that are too large to be accepted by the regular waste pre-collection and collection systems, requiring differentiated handling;
- **Micro-zone** - geographical area served by a transfer station;
- **Waste management zone** – geographical area served by an integrated waste management system (sanitary landfill, transfer stations, waste treatment facilities).

1 Introduction

The purpose of the Regional Sector Program (RSP) is to create operational instruments that will be used in the regional planning in Development Region Centre (DRC).

The regional planning activities in municipal waste management refer to solid waste management and management of waste similar to the latter, which can be generated by institutions, commercial and industrial units. Wastes generated by other units include:

- Bulky waste;
- Waste from parks, gardens, markets and streets;
- Waste electrical and electronic equipment (WEEE);
- Construction and demolition waste;
- Waste oils;
- Waste tires;
- Waste accumulators and batteries;
- Discarded vehicles;
- General hazardous household waste;
- Manure in rural areas;

The management of hazardous waste generated by industries and legal entities is beyond the purpose of this document.

The urgent need for sectoral planning emerged after the experience gained by the central and regional public authorities in identification of projects for funding under the two calls for project proposals. The submitted projects were initiated without any referral to national or operational strategic guidelines. The need for a change became obvious, in order to facilitate design of better prepared projects, based on both national policy and a more detailed regional planning of the waste sector.

The basis for the development of strategic sector programs is the regional and the national strategic framework for waste management.

In the process of sectoral planning, criteria for identification of possible project proposals (PPP) that will later be developed into viable projects for funding were proposed. These criteria for identification of each PPC are in line with the criteria for identification of waste management areas. According to the regional approach, the waste management areas will be managed by all LPAs in these areas. The DRC has 3 areas identified for this region. Therefore, 3 system PPCs will be reviewed for the DRC.

RSP is a tool for strengthening the planning and programming capacities in the DRC. It is also an operational tool to be used in further supporting the development of better investment projects in Moldova. This finding is determined by the fact that the RSP:

- Includes sector development (medium-term) needs, in line with the existing sector policies, practices and the relevant strategic framework;
- Defines the needs for financial investment in the sector at the regional level;
- Helps in decision-making on the financial sources needs for the development of other projects;

- Helps in the dialogue with the potential development partners, presenting a clear vision on the development needs and prospects in the reference area.

At the same time, there is a clear understanding in the working group on delimitation of the regional sector programs' role. Thus:

- RSP do not aim to create an additional set of policy documents in the RD;
- RSP development does not substitute the process of sector policy development at the central level, but facilitates their implementation in the regions;
- The RSP must be perceived as comprehensive programs that would target the exhaustive implementation of all aspects of the national policy at the regional level;
- RSPs are not "master plans or general plans".

This document will provide a basis for waste management, the continuation of activities related to the detailed design and implementation of waste management systems recommended in the DRC, under three phases, namely: short-term (2013-2017), medium term (2018-2022) and long term (2023 and beyond).

Priority will be given to projects that can be implemented in the short and medium term. Implementation of the recommendations of this document will result in the creation of a solid waste management system in the DRC, which will be linked to the national development targets, EU policies and will have a significant contribution to national and regional development.

The RSP development methodology has been applied based on a participatory approach, based on the decisions of the Regional Sectoral Working Group Representatives (RSWG), and established under the auspices of the Centre Regional Development Agency.

RSWG include one representative appointed by each rayon in the DRC, representatives of the Ministry of Regional Development and Construction (MRDC) and the Ministry of Environment (MoE), operating with the technical assistance of national and international GIZ experts.

The participatory approach and public consultations for the RSP were ensured by the workshop format, where all information, analyses and recommendations on sector planning were presented and discussed.

This document was developed in several stages, ensuring a balance between national objectives in the area, local and regional needs and initiatives in the territories and was coordinated with stakeholders:

- Baseline data were collected from all rayons in the DRC. This information includes demographic and economic data, information about the amount and types of waste, data on technical, financial and organizational aspects of waste management and information on current and planned waste management initiatives, on-going projects funded by the National Environmental Fund (NEF) and the National Fund for Regional Development (NFRD), development partners, etc.;
- Estimates of the number of population and the volume of waste were developed;
- Options were reviewed for clusters of districts that may work together in a waste management system, based on which appropriate recommendations were developed;

- Waste management technologies that may be used in each cluster of rayons were analyzed and the optimal technologies were recommended;
- A financial assessment of the affordability of the proposed waste management system was carried out and financial arrangements were recommended, including tariffs, billing and cost recovery procedures;
- Options for institutional arrangements were reviewed and the preferred options recommended;
- Gender issues were studied;
- An action plan was developed.

2 Current situation review

2.1 Policy, Legal and Regulatory Framework

Policy, legal and regulatory framework relevant to waste management includes policy documents addressing environment protection and the administrative measures relevant to waste management services that do not provide the full range of requirements on environment protection as a result of waste management. This legal framework includes the following laws:

- Law of the Republic of Moldova no. 438-XVI of 28 December 2006 on regional development. This law includes the need to develop a National Strategy for Regional Development, the provisions of which, in turn, are translated into regional development strategies, which become the main regional planning and development documents. At the same time, the Law provides that regional development strategies include operational plans containing programs, projects and major activities. According to this law, the Regional Development Agencies are created to coordinate development in the North, Centre and South regions. Each Region has regional development strategies, the priorities of which include improvement of the environment and implementation of an improved solid waste management;
- Law on public utility services no. 1402-XV of 24.10.2002. The main provisions of the law are:
 - Public utility services (which by definition include waste management) are municipal services within the jurisdiction of municipal territorial unit;
 - Municipal public services can be provided through individual and municipal enterprises, joint stock companies, limited liability companies, companies with other legal forms of organization, including specialized departments of local authorities, businesses, regardless of their legal form organization, or individuals and/or associations thereof;
 - The Government of Moldova supports and promotes inter-municipal partnerships and associations for the establishment and operation of systems and services. As regards the financing of municipal services, priority is given to public-private partnerships, associations of local public administration authorities and private operators;
 - The National Agency for Energy Regulation approves tariffs for supply/provision of municipal public services;
 - Local authorities have exclusive competence in the establishment, organization, coordination, monitoring and controlling of the operation of local public services and the creation, management and exploitation of public assets of municipal infrastructure of administrative-territorial units;
 - The operators established by local authorities for supply of public utility services will be established at the rayon level.
- Law no. 436 of 28.12.2006 on local public administration stipulates the following:
 - Local councils may be associated with other local authorities to take over public works and services and to promote and protect the interests of local public authorities. Each rayon approves the strategy, the forecasts, plans and programs for its economic development, recovery and environmental protection programs, as well as the arrangements for implementation and monitoring of taken actions. Each rayon decides whether to associate with

other local authorities in order to carry out public works and services that promote and protect the interests of local public services.

- Law no. 435 of 28.12.2006 on administrative decentralization reads as follows:
 - Waste management is the responsibility of the first level local public authorities (towns and villages). First and second level (rayon) local public authorities have full competence in the regulation and management of any local issues of concern that are not assigned to other authorities;
 - First and second level local public authorities may cooperate in projects or public services that require combining their joint efforts. The activities to be carried out through cooperation will be provided in the agreements signed between the parties in accordance with budgetary resources and responsibilities assumed by these. The agreements involve clear identification of the sources of funding and limits of decision making for each local public authority. Agreements on the provision/supply of services through the private sector may be signed by first and second local public authorities.
- Law no. 1347 of 09.10.1997 on household and production waste provides:
 - The Ministry of Environment has the lead role in formulating policy on waste management and carrying out state control over observance of legislation by legal and natural persons in waste management;
 - Does not include new approach of EU Directives on waste. To meet these requirements, this law must be adjusted to reflect, in particular, the standards and approaches of EU Directives;
 - The draft waste law, designed to substitute the Law no. 1347 of 09.10.1997, includes transposition of the requirements set out in the Waste Framework Directive of the EU (Directive 2008/98/EC) and the principle of "extended producer responsibility". This law is currently at the stage of coordination. In addition, a draft law on sanitation was developed, establishing a uniform legal framework for the organization, regulation, management, operation, financing and control, of operation of the sanitation service in localities and communities.
- Law no. 851 of 29 May 1996 on Ecological Expertise and Environmental Assessment states:
 - Environmental Impact Assessment (EIA) is mandatory for new projects, programs, plans, schemes, strategies and concepts, in particular for strategic documents related to national economy, for projects and activities that depend on the expected level of impact assessment. According to this law, the EIA documents must include an assessment of alternatives and an environment protection plan, that would address prevention of pollution of water, air, fauna and flora resources against the impact of generated and improperly managed waste;
 - Approval of EIA documentation must be carried out before the design and construction of landfills, regardless of their capacity. This law partially meets the requirements of Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment and of the Convention on EIA in a Trans boundary Context, ratified by the RM in 1993;
 - A new draft law on EIA transposes more fully the provisions of the abovementioned Directive and Convention, where EIA is provided at a cross-border and national level for activities in Annex no. 1 and 2 to the law. According to this law, the EIA documentation shall also be mandatory for

waste disposal facilities (not included in Annex no. 1 to this law, with the capacity of 50-100 tons/day). This law is currently pending review in the Parliament of RM.

- Law no. 1540 of 25 February 1998 on payment for environmental pollution, implements the "polluter pays" principle by levying a tax on pollution generating activities and products, including:
 - Pollutant emissions of stationary sources;
 - Pollutant emissions of mobile sources;
 - Pollutant emissions by motor vehicles not registered in the Republic of Moldova;
 - Discharges of pollutants;
 - Storage of production waste;
 - Imports of goods, which, in the process of use, cause environmental pollution.
- Waste Management Strategy, approved by GD no. 248 of 10.04.2013, stipulates:
 - Future waste management should be based on integrated waste management concepts on a regional scale, to be achieved through instruments to harmonize the legal, institutional and regulatory framework with EU standards;
 - Identifies the main problems and solutions related to waste management and the key actions needed to implement solutions and ensure an integrated socially, economically and environmentally efficient system;
 - Identifies the major problems related to the existing waste management system in the Republic of Moldova, including in the regions;
 - Plans for the next 5-7 years measures to reduce the waste management impact on agriculture, tourism development, drinking water supply and public health;
 - Solutions to the identified problems, which will be developed according to policy approaches: (i) The integrated waste management will be developed by harmonizing the legal, institutional and legal framework to EU standards, (ii) Regional approach whereby more communities and districts are using a single infrastructure for waste management, (iii) In this context, the Strategy proposes a preliminary territorial division of the country into waste management regions;
 - The strategy is based on the provisions of the draft new Association Agreement EU - Republic of Moldova, which is being negotiated and which sets up the future legal framework on waste management. The signing of this agreement will establish a closer relationship for progressive development between Moldova and the EU in this area, based on a single policy of strategic directions in the field of waste management and the adoption of EU standards. According to this document, the central and local public administration authorities will have much greater responsibilities in the waste management sector.
- Conclusions regarding the existing political, legal and regulatory framework:
 - There is a shortage of the legal and regulatory framework for the successful implementation of an integrated waste management system according to EU requirements;
 - There is a political, legal and regulatory framework that would support the institutional basis for the development of regional sector programs for the waste management, namely on: adopting a regionalized approach for the

development of waste management programs, creating an inter-institutional inter-municipal ("regionalized") framework to guide the development, approval, implementation and operation of waste RSP; recommending "association of municipalities" as the basic inter-municipal entity for program implementation;

- The existing policy, legal and regulatory framework partially supports the technological basis for the development of waste RSP, but it seems to be insufficient, given that the existing legal framework requires adjustment. Two draft laws have been developed, the waste management strategy is adopted, but there is still no comprehensive legal framework for promoting EU standards in this area. However, the documents concerned can be used as a basis for planning issues related to the inclusion of various technological options on waste management, in accordance with the hierarchy of waste management, but also to assess the options that are defined on the basis of EU standards;
- The policy, legal and regulatory framework does not clearly define the provision of financial support for the sector and only refers to financial sustainability, which is insufficient for the development and implementation of the project;
- The policy, legal and regulatory framework in cooperation for service provision provides for the possibility of the communities to establish inter-municipal entities for the purpose of waste management. While national entities play important policy, regulation, monitoring and enforcement roles, decision-making on waste management concerning the operational and administrative issues is performed locally, and this factor will be taken into account in the following stages of decentralization that may be promoted by the Government of Moldova;
- The adoption by the Government of the Republic of Moldova of the legislative framework for local public administration and municipal services in 2002 - 2006 assigned the responsibility of APL 1 (communities) to provide public waste management services and APL 2 (rayons) - planning responsibilities related to waste management.

2.2 Institutional Framework

The institutional framework providing specific competences in waste management includes the following:

- The Ministry of Environment is the competent authority empowered with responsibilities for the development, promotion and implementation of state policy in the field of waste management. It performs the environmental assessment of programs, schemes and projects related to transportation, storage, processing, neutralization, recovery, use, burial and disposal of waste, coordinates the projects of construction and reconstruction of economic and social destination buildings;
- The Ministry of Regional Development and Construction is responsible for developing the regional development policy, coordinating and monitoring, in cooperation with the Regional Development Councils, the process of developing regional strategies and development programs;
- The Ministry of Health provides sanitary-epidemiological supervision of formation, transportation, storage, processing, neutralization, use, burial and disposal of waste, coordinates decisions on impact on land for the storage and neutralization of hazardous waste, coordinates, in terms of compliance with sanitary-

epidemiological requirements, the project documentation for the construction or reconstruction of enterprises and other facilities generating waste;

- The RDA is responsible for implementing the RDS and ROP containing priorities and measures (RDS), programs and projects (ROP) in the waste management related field;
- LPAs are responsible for the organization, management, administration, monitoring and control of the operation of public utility services and coordination of their activity. Management of public utility services may be provided directly by LPAs or through public-private partnerships. LPAs are responsible for developing programs for rehabilitation, expansion and modernization of the existing facilities, as well as programs for setting up new public utility systems, coordinating the design and execution of technical construction works, in order to achieve their correlation with the country's programs for socio-economic development of localities, with landscaping plans, general urban development plans and environmental programs. At the same time, LPAs are responsible for adopting, jointly with the local environmental and health authorities, decisions on the construction and expansion of sites for the processing and neutralization of waste, systematic tracking of generation, storage and processing of waste on the subordinated territory, organization of waste collection and disposal, preparation of records of waste disposal sites etc.

The services provided by LPAs in collection and disposal of waste depend largely on their capacity to manage the services and to involve the private sector and the civil society in the accumulation of financial resources, which does not always meet the requirements of the day.

2.3 Sanitation services

The municipal sanitation companies in the DRC provide services for collecting and transporting waste from the storage sites existing in the locations. These companies are established in accordance with the legislation on local public administration and public utility services, as well as other regulatory acts in this area. The quality level of services provided in different regions is different, but their assessment is not conducted by LPAs or other authorities, as there are no regulatory acts developed on services' performance criteria. Waste disposal from localities to storage sites is organized with different frequency, depending on service equipment with necessary machinery for collection and transport units available in each locality. Equipment of services with machinery for collection and storage of waste, and the status of the existing storage sites are shown in Annex no. 1 to this document. According to the Annex, there is an insufficiency recorded in endowment of sanitation services in the DRC with equipment and financial resources necessary for effective management of the sector.

Municipal sanitation companies are responsible for ensuring waste compaction and storage technology, for ensuring the ecological status according to the provisions on operation of such sites, but this is not done because of lack of funds and equipment.

According to the results of the inventory conducted in the DRC, about 23 sanitation services were identified, of which 12 - in urban areas and 11 - in rural areas, which mean a 100% coverage of urban areas and about 2.3% coverage of rural areas with sanitation services. These service providers are conducting collection, transportation and disposal of waste to a local storage site, in an organized manner. These companies are operating under a contract signed with individual waste generators.

In rural areas, where sanitation services are not available, waste disposal is carried out individually by people who generate waste. They dispose waste in recreation areas, in river valleys, green areas, thus damaging the environment. All generated waste, including various categories of waste, get into waste bins, as there is no centralized system for separate collection. There has been a trend recently to cover some rural localities with waste collection services, including separate collection, by expanding urban sanitation services.

The current separate collection services are provided by some entrepreneurs who purchase certain recyclable materials: paper, cardboard, glass, PET bottles, but this process is not centralized or controlled.

As of 2012, sanitation services in DRC were provided in Ungheni town. At the same time, some feasibility studies have been conducted on concessioning of sanitation services in a number of localities (Anenii Noi - 7 villages, Ialoveni - one village, Nisporeni - 3 villages, Orhei - 12 villages, Rezina - 3 villages).

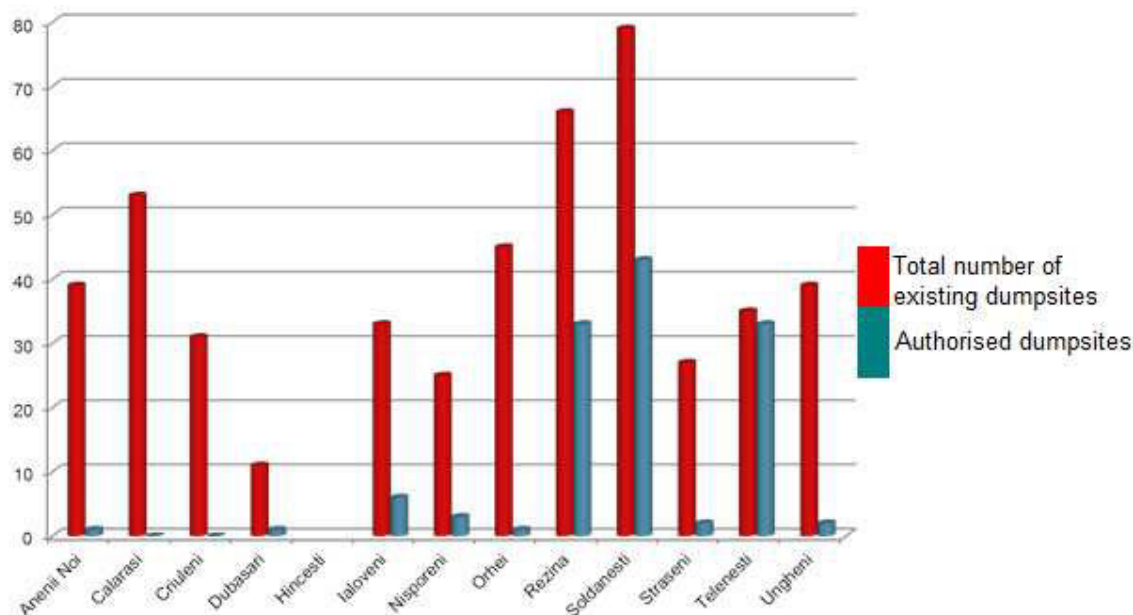
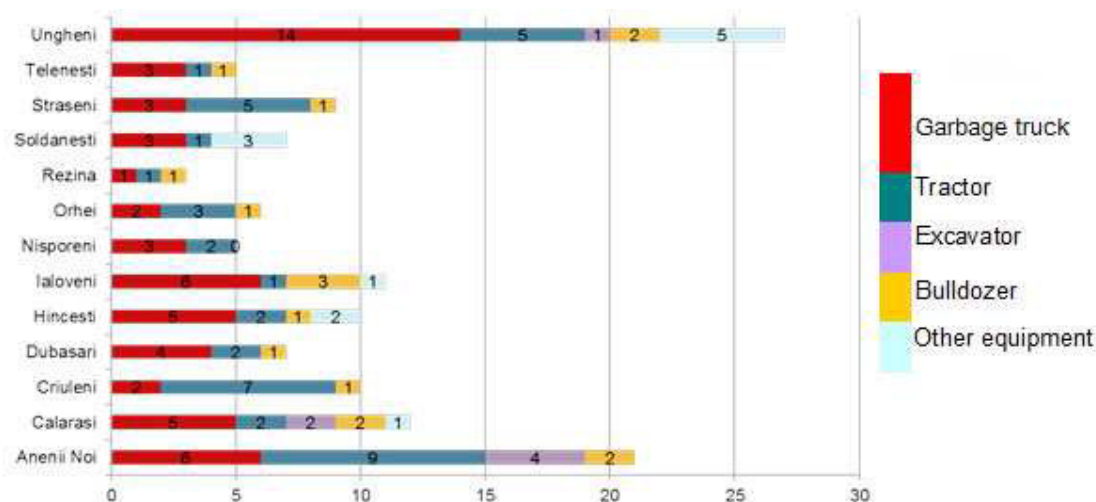
According to analyses on the enforcement of service concession contracts conducted by the Public Property Agency, it was concluded that the feasibility studies prepared and presented by local authorities to justify the conclusion of service concession contracts did not meet the requirements on the form and content of a feasibility study. The risk of such contracts is that they do not present any comprehensive analysis of the local sector, based on which sector planning decisions can be made. This may create obstacles in RSP implementation.

In the DRC, the amount of collected and stored waste is not registered because there is no organized and permanent weighing or monitoring of it. Thus, the amount and the types of waste collected or recycled in each locality, rayon and region are not known. Sanitation services apply the method of waste disposal on land or in existing dumpsites, which in most cases are not authorized and are a major source of soil and groundwater pollution. These dumpsites do not meet modern environmental standards in terms of their location, design, construction and exploitation. The disposed waste is not compacted or covered with inert material to prevent fire and the spread of odors.

There is no control of the quality and quantity of waste landfills, no national program for capturing landfill gas or for the collection, recovery/treatment of leachate, the access roads to waste disposal sites are not maintained, vehicles and other equipment are not cleaned, waste disposal sites are not fenced, guarded and marked. Almost every community has its own landfill, and therefore the communities in CRD are full of waste and lighter fractions carried by the wind and light.

Figure 2-1 presents information on existing landfill sites in the DRC, as well as on their legal status.

Figure 2-2 shows the existing equipment used in the waste management system in the region.

Figure 2-1: Existing landfill sites and their legal status

Figure 2-2: Equipment used for waste management


2.4 Existing sector funding sources

The main sources of funding available for the waste sector include: State Budget, National Environmental Fund, the National Fund for Regional Development and the individual contributions of enterprises, and in recent years - international financial resources of development partners. These funds are used to finance a wide range of waste management projects throughout the Republic of Moldova. At the same time, no central national institution currently has any comprehensive record of investments in waste management from the abovementioned funding sources. However, data from the Waste Management Strategy show that in 2002-2006 LPAs received about 1 million Euros under the EC Good Neighbourhood Program for waste management. Under this program 4 projects are financed, with a budget of about 15 million lei. During 2005-

2012, tens of millions of USD were allocated from the abovementioned funds for the purchase of specialized equipment for collection, transportation and liquidation of non-compliant landfills. Only for liquidation of these landfills and organization of others about 100 million lei were allocated from the NEF during this period.

The recent years' experience shows that these investments received from various sources are not properly coordinated and did not allow achievement of expected results in waste management.

The operational revenue sources for the waste management system are a combination of budget allocations and revenue from the collected taxes, but they cannot cover expenditures for the management of the entire sector. Budget allocations are made from local budgets and range from 5% to 20% of their value. The level of charges for services varies between 5 and 10 lei/person/month (0.33 to 0.67 €/month) in different rayons. Legal entities pay approx. 70-110 USD per m³/ waste they generate.

Lack of financial sources in the sector is caused by a number of factors, including application of inadequate management in collection of payments from waste generators and in provision of budgets from non-tariff revenues.

To increase the effectiveness of sanitation services, the method of payment for services by waste generators, particularly by the private sector owners who do not honour their obligations of paying for such services must be revised.

Financial resources available for managing the sector are insufficient to cover all expenses related to waste management. According to information submitted by the existing sanitation services, the financial resources accumulated from payments for services cover the transportation expenses only, while the expenses related to burial technology are not covered. There are no resources to support the development of new technologies in the sector. The non-tariff revenues are not accumulated and are not part of the budget of expenditure for provision of services, as the separate waste collection and recycling of the useful fraction are provided by economic agents who, on the one hand, contribute to reducing the volume of waste stored in the landfill and, on the other hand, revenues from the recycling process do not return to the existing system's cash flow.

2.5 Gender issues

Gender issues in planning processes in Moldova are not covered or are not considered. Gender was mainstreamed at all stages of planning, starting with ensuring equal participation rights in sector planning and consultations, differentiation and disaggregation of data available in the sector subject to review and stakeholders' awareness on the importance of gender equality.

So far the waste management at national and regional levels has not been studied enough to make decisions on the development of the sector with application and mainstreaming of gender issues, namely:

- Attitude towards waste management and public health/hygiene varies between men and women, women having higher requirements for the public health and cleanliness level than men. Poor public health and low cleanliness level of public spaces are often related to improper management and insufficient collection of waste.
- Thus, women are more likely to pay more for waste management than men, as the benefits of waste management are a more important value for them. The roles of men and women influence their perceptions, as the women have the main responsibility for the purchase of daily needs and for cleaning the household (including waste management in the house and disposal of waste in a street

container). The procurement decisions of women are thus the key as regards the amount of waste generated in the daily activities (ex. waste related to food packaging). Also, women are more interested than men in some issues related to waste management, such as placement of waste bins and the frequency of emptying street containers.

2.6 Social issues

The standards of living of the urban population differ from those of the rural population, which has fewer economic prospects, lower income per capita compared to the population of the urban areas and difficult access to public sanitation services.

Development of cities as urban centres is an opportunity for regional development policy, including for the implementation of public utilities services, being seen as an opportunity for gradual revitalization of Moldovan economy and raising the standard of living in all regions of the country.

There is a need to expand sanitation services from towns and cities to villages, thus helping to increase the quality of life and living conditions in rural areas, in line with those in urban area. These criteria, as well as national objectives in waste management are taken into consideration when developing the RSP in this area. In this context, it should be noted that, in accordance with EU practice, the total annual cost per capita for solid waste management services must not exceed 1.5% of annual income per capita in the area served by the waste management system.

There is a vital need for planning the waste management sector in the regions and attracting investments that will solve the socio-economic problems related to the following:

- Creating new jobs, including through recycling of materials;
- Improving external exchange reserves by exporting recycling materials;
- Promoting agricultural productivity by producing compost according to quality criteria;
- Ensuring local energy security through energy recovery from waste;
- Obtaining new sources of revenue from actions targeting reduction of carbon dioxide emissions associated with waste degradation;
- Improving access to quality care, the state of the environment and human health.

2.7 Lessons learned in the Waste Sector in Moldova

The waste management system in Moldova is at an early stage of development. For a successful development of the sector in the region the experience acquired in this field and in other areas must be taken into account, as it can provide information support for waste management planning. These experiences concern the following:

- In Development Region South a Strategy for Waste Management was developed for a 15-years period in 2011 with EU support, adopted by the Regional Development Council. The lessons learned from this activity include:
 - The participatory approach involving local decision-makers and stakeholders is an effective mechanism for presenting analyzes, discussing issues and making generally acceptable recommendations;

- The regional approach to waste management can achieve a number of national, regional and local development objectives in a cost effective manner and in a way that is acceptable to local authorities;
- Inter-municipal cooperation through various forms of association of local public authorities may become a flexible mechanism to ensure local decisions on the application of an efficient management and coordination of waste management activities for the benefit of all local public authorities. However, the development of legal and regulatory framework must be continued in order to support an efficient performance of LPA association.

In 2012/13 there was a significant interest among local public authorities concerning establishment of partnerships with the private sector for delivery of waste management services based on service concession contracts. No effective planning process supporting concession initiative has been conducted yet, and the signing of concession contracts has not been the object of any earlier public debate.

Moreover, the relevant legislation on the development of concession contracts has not been considered. Concession contracts for a period of 49 years, signed by LPAs, may not have the capacity to implement all aspects of the RSP in the context of the region, which (if legal) impose a significant financial burden and risk of failure by LPAs to implement the planning expected in the RSP. Therefore, there is a strict requirement for the regional planning process to apply the participatory principle, in order to ensure transparency of information concerning the future needs of the community in terms of services related to sector management and the related costs.

It should be noted that 67 local public authorities in the DRN and the DRC have applied certain measures to establish inter-municipal cooperation by signing agreements for joint provision of waste management services, but have encountered some difficulties in terms of planning, enforcement of environmental impact assessment legislation, land ownership, and other problems. Despite these difficulties, significant experience has been gained in the development of inter-municipal cooperation and public awareness on the waste management issue. These experiences were very helpful in developing the RSP for waste management and serve as basis for making decisions on the creation of institutional structures and partnerships in the field.

2.8 Key findings on the existing Waste Management

The key findings concerning the existing waste management service are as follows:

- Waste collection covers the urban population at 100% and the rural population - at a rate of 2.3%, which is a serious issue in the living conditions of the population;
- Approximately 473 existing landfills do not meet the international environmental standards, and therefore are a threat to public health and environmental resources, except for 3-4 landfills built according to environmental requirements (Hinesti, Nisporeni and Telenesti);
- The shortage of capital in the sector for the reason of improper coordination of funding for waste management infrastructure.
- The domestic budget expenditure is insufficient to achieve minimum standards of service and to protect public health, environment and tourism development in the region;
- Insufficient management and administrative capacity at all levels;

- Drawbacks in sector planning, including in the area related to attracting private capital in financing infrastructure and waste management equipment, which creates confusion and uncertainty as to the actual capacity of the private sector to provide services;
- Incapacity/unwillingness of communities to pay for WMS services;
- The waste management activities do not comply with the waste management hierarchy, established according to UE directives, which proves the existence of a significant impact on the environment in the region. The way the waste is managed in the EU as a whole, in three countries - Hungary, Poland and Estonia, which joined the EU in 2004, and Romania, which joined the EU in 2007, is presented in Table 2-1. The data resulting from comparison of the share of waste disposed in landfills show that in Moldova, the waste disposal in landfills is the only applied solution, while waste recycling accounts for only a small percentage. This applies to the DRC as well.

Table 2-1: SWM in the EU, selected EU member states and in RM in 2011¹(in %)

Management arrangement	EU	Hungary	Poland	Estonia	Romania	Moldova
Storage	37	67	71	70	90	> 98
Incineration	23	11	1	0	0	0
Recycling	25	17	11	20	10	< 2
Composting	15	5	17	10	0	0
Total	100	100	100	100	100	

¹ Source: Municipal waste generation and treatment (Generarea și tratarea deșeurilor municipale), Eurostat, 2011; <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdpc240>
Data for Moldova are tentative.

Data for Romania are taken from Key issues in municipal waste management in EU-11 countries; [http://www.ey.com/Publication/vwLUAssets/Key_issues_in_municipal_waste_management_in_EU-11_countries/\\$FILE/Raport_eng.pdf](http://www.ey.com/Publication/vwLUAssets/Key_issues_in_municipal_waste_management_in_EU-11_countries/$FILE/Raport_eng.pdf)

3 Vision, objectives

3.1 Strategic vision of the stakeholders

The vision of stakeholders from the DRC was presented by the RSWG in the DRC, which participated in the development of this program and formulated the sector development vision, being inspired by the national strategic directions, particularly on integrated waste management and the regional approach. This vision statement is presented as follows: "Solid waste management must be integrated, modern and efficient in economic and technical terms and based on inter-municipal cooperation through the public awareness perspective (environmental friendly impact), as a cornerstone of a healthy surrounding environment".

This statement shows that the need for cooperation between communities is seen as a central element of future waste management activities and stresses that in the future the waste management will use a variety of technologies to be applied efficiently and meet modern standards.

3.2 Overall and specific objectives of the RSP

The overall objective of the RSP is to improve local public services for waste management in the RDC, through gradual transition to the new standards according to EU Directives.

The overall objective of the RSP in SWM is focused on specific objectives that will contribute to strengthening the potential of implementing the waste management system in the DRC.

The specific objectives provide as follows:

- Strengthening the political, legal and regulatory framework by 2018 to ensure the establishment and operation of the regional waste management system;
- Strengthening and developing the institutional framework, taking into account the entire regional waste management system;
- Developing waste management infrastructure in the region, taking into account all the elements necessary for the operation of the regional system;
- Informing, raising public awareness of the need for waste management at regional level.

4 Forecasts/ options/ strategic guidelines

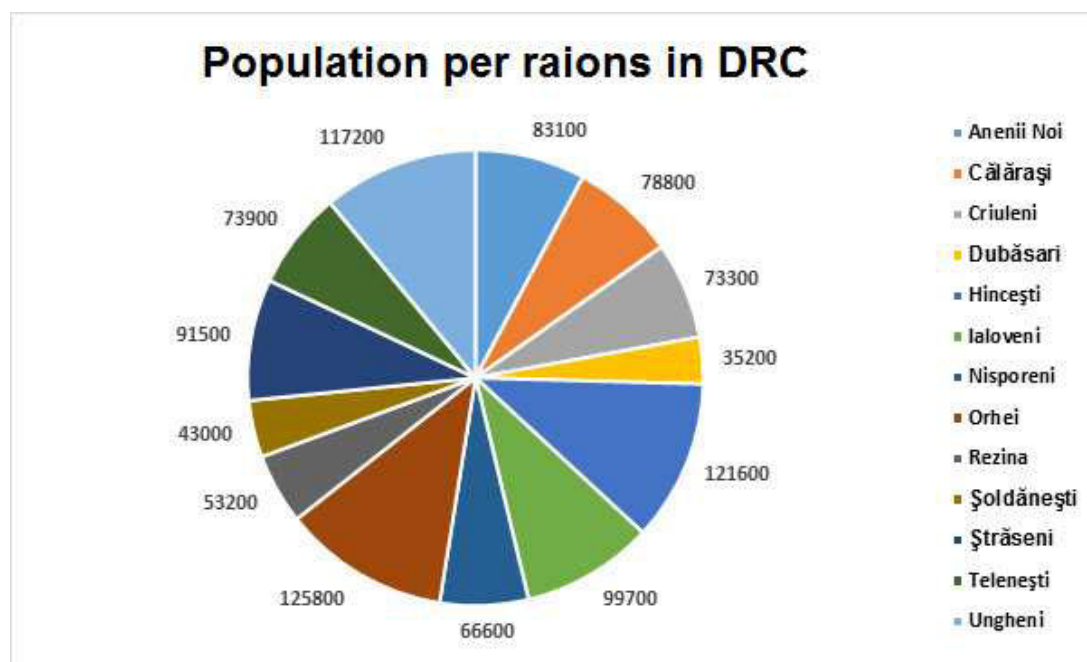
4.1 Projections concerning population, the amount and the structure of waste

The waste sector in the DRS has not been studied so far and as a result the current and historical amounts of generated and manipulated waste are not known.

The projections presented in this document were based on the waste sector audit data, presented at GIZ proposal, for the Municipal Enterprise "Regia Apa Canal Soldanesti" in 2010, also taking into account the data from neighbouring counties of Romania and specialized analyses based on observations during the field visits.

Figure 4-1 shows the number of population of RDC rayons in 2013, based on data provided by the National Bureau of Statistics, according to which a population decline of 0.2% per year is forecasted.

Figure 4-1: Population of DRC Rayons (2013)



The national GDP is expected to grow in the following years at a rate of approx. 5% per year, while in regions outside Chisinau this growth is expected to be half this rate. The economic growth even if slow, allows incurring higher expenditures and results in a higher level of consumption, which increases the amount of waste generated per household and therefore generates a higher overall volume.

The estimated waste amount in the DRC was based on the above data, as shown in Table 4-1.

Table 4-1: Cumulative waste generation (2018-2043)

Year	2018	2023	2028	2033	2038	2043
Aggregate generated tons	204,190.7	1,265,189	2,320,790	3,365,877	4,400,554	5,424,927

Year	2018	2023	2028	2033	2038	2043
of waste from 2018 and forward						

Further details on waste amounts and structure are provided in Annex 2.

4.2 Sector financing

According to studies of the Waste Management Strategy, the waste management sector at the national level requires huge investments, which means, of course, involvement of financial institutions of the state in financing objects designed for recycling and disposal of waste and of foreign financial institutions for building infrastructure related to this sector.

Both domestic and foreign sources will be used for sector financing.

The domestic sources of funding primarily include the State Budget, the National Environmental Fund (NEF), the National Fund for Regional Development (NFRD), individual contributions and those of businesses. For 2013-2015, the Ministry of Finance identified a budget of approx. 225,755 million lei (approx. 13 million Euro) in the medium term expenditure framework for waste management activities, of which approx. 4 million lei (approx. 0.25 million € or 1.7% of the total) will be attracted from domestic sources and the remaining amount (98.3%) – from the National Environmental Fund.

The value of the National Regional Development Fund amounts to 1% of the approved revenues of the state budget for the relevant year, excluding special purpose revenues provided for by law, and their allocation is made under the Single Programming Document, approved based on Calls for proposals launched for the multitude of priorities and measures at the same time.

The available budget of the National Fund for Regional Development in 2013 is MDL 191 mln, and according to the medium-term budget framework, by 2015 the budget amounts to 625 mln MDL. The external funding is received from the financial and technical assistance, including grants and loans provided by international financial institutions and bilateral donors, resources for the implementation of international agreements and foreign investment.

The external sources of funding include international financial institutions (IFIs) and donor agencies that may have a major contribution in the development of the sector, such as the European Investment Bank, European Bank for Reconstruction and Development, World Bank, USAID, which implement projects on Moldova. IFIs have shown their availability to finance waste management projects, depending on preparation of projects they consider viable.

One of the preconditions for IFI participation is the state guarantee. A number of donor countries and the EU have expressed their willingness to support the further development of the waste management sector. In some cases it is intended for technical assistance and preparation of investment projects. Such assistance is often accompanied by the "grant" component, but development of investment projects - in accordance with donor standards and international practices on sustainability of projects and thorough analysis of all aspects of feasibility - technical, economic, social and environmental - is absolutely imperative.

The private sector funds are usually made available by concession contracts or other forms of public-private partnership. The availability of private sector funds has been demonstrated in principle by signing several concession contracts in the waste sector and building waste treatment facilities (mechanical biological treatment plant, not func-

tional in Chisinau). Private sector investments require connection to national sector policies and correct and proper coordination respectively. The funds in this sector can provide an important investment opportunity. However, these funds usually involve higher costs for the beneficiary, as the cost of capital is higher in the private sector than the public sector. In addition, it is essential if private sector funds will be used. They must be requested as response to projects that are defined by the public sector in a planned and strategically justified manner.

4.3 Waste management hierarchy principles

To encourage an efficient management of municipal waste, the RSP will take into account the principle of waste management hierarchy in line with EU policy. In this context, the priority of activities for a sustainable waste management will be as follows:

- **Prevention and reduction:** Minimize waste. Some waste could be avoided completely, while in other cases amounts can be minimized. Particular priority should be given to reducing the hazardous components of waste, while some hazardous materials should be completely removed from the waste stream;
- **Reuse:** Re-introducing objects in use, so that they do not enter the waste stream. Examples include re-treading of tires and recharge of bottles;
- **Recycling:** Separation of materials for conversion into new products such as re-processing of used paper into new paper products;
- **Recovery:** Getting more value from waste by turning it into something different, such as converting organic waste into compost and energy recovery from waste;
- **Land disposal:** The least attractive waste management option. A priority in waste disposal would be ensuring that it is carried out at a high standard in order to limit environmental impact.

The application of the hierarchy described above in the management of a new regional waste management system will help ensure its financial and economic sustainability and reduce its environmental impacts. According to these principles, targets for the development of the sector were established.

4.4 Sector development targets

The strategic directions established at the national level are included in the Waste Management Strategy and are geared towards integrated waste management, which is planned to be performed on the whole territory of Moldova by 2027. The Strategy also identifies that the short-term period (2013-2017) is characterized by planning, strengthening the legal and institutional framework, followed by implementation and investments in the sector, in order to achieve a modern integrated waste management system. The strategy identifies development of the principles of recovery and reuse of resources, together with the gradual reduction and rehabilitation of waste, which will be replaced by a small number of landfills that will serve several regional communities as a priority.

As a result, the sector development in the RSP in DRC will reflect the strategic direction related to promoting regional approach to sector planning in accordance with the Waste Management Strategy.

The implementation of waste management hierarchy principles requires the establishment and achieving of sector development targets, defined for three main development

stages, namely short-term (2013-2017), medium (2018-2022) and long term (2023 and beyond), as required by Table 4-2.

The achieving of targets will be connected to specific objectives classified in chap. 3. The RSP for waste management for the DRC focuses on attaining sector development targets for the short and the medium term, while the long term targets will be achieved through more efficient use of infrastructure to be built in the short and medium term.

In this table, the targets are set for each stage of waste collection activities, recovery of resources from packaging waste, organic waste and special waste (hazardous, construction and demolition and bulky waste), as well as for the gradual disposal and land-filling.

Table 4-2: Sector development targets²

Planning Period	Waste Collection	Waste Recovery ³		Special waste ⁴		Transfer stations and waste disposal
		Packaging materials	Organic waste	Bulky waste	Construction and demolition waste;	
In the short term: 2013-2017	100% of urban and 75% of rural areas	15% (rural areas) and 25% (urban areas) of recycled waste	Pilot projects to be developed/implemented for demonstration of the most efficient measures	40% treated properly for safe recycling or disposal	40% treated properly for safe recycling or disposal	Development of a transfer station per micro-zone; Reduction of the number of landfills to 1-3 consolidated locations per rayon; Initiation of construction of a sanitary landfill; Initiation of recovery of old landfills
Medium term: 2018-2022	Coverage of 100% of rural areas	25% (rural areas) and 35% (urban areas) of recycled waste	50% (rural areas) and 40% (urban areas)	Reused 55% treated properly for recycling and/or disposed safely	55% treated properly for recycling and/or disposed safely	Reduction of the total number of landfills to not more than a sanitary landfill per waste management zone, gradual closure/rehabilitation of remaining landfills
Long term: 2023 and beyond		35% (rural areas) and 45% (urban areas) of recycled waste	100% reused	70% treated properly for recycling and/or disposed safely	70% treated properly for recycling and/or disposed safely	Waste disposal to a sanitary landfill per waste management zone

² These sector development targets follow the Waste Management Strategy and have been developed in coordination with the national and local stakeholders for the DRC.

³ The national solutions for the management of this waste will state that each of these categories of waste should be collected separately, stored separately and treated, recycled or disposed separately.

⁴ In addition to the targets identified for these types of waste, targets for the recycling and management can be established in coordination with the national relevant entities and producers, as relevant, for the following categories of waste: hazardous household waste, used tires, waste oil, waste batteries/accumulators, waste electric and electronic equipment, discarded vehicles.

4.5 Options for selection of Waste Management Zones

To streamline the current waste management zones and create an integrated waste management system in the region, it becomes important to select a model for provision of services and applied technologies, which can be efficiently promoted by management zones, according to the experience of the European countries.

Waste management at the level of management zone implies that a number of communities use the same technologies, facilities and equipment.

Management zones are identified according to the criteria listed in the Waste Management Strategy. These include:

- Issues related to geographical position;
- Economic development;
- Availability of access roads;
- Soil and hydro-geological conditions;
- Number of population etc.

For DRC, waste management zones were selected by drawing and analyzing scenarios aimed to determine the preferred clusters of rayons in these zones at the regional level, taking into account the criteria set out in the Waste Management Strategy. The analysis was conducted for three scenarios in accordance with Table 4-3.

Table 4-3: Scenarios for assessing potential waste management zones

Scenario A1	Scenario A2	Scenario B	Scenario C
Centre Region			
Ialoveni	Ialoveni	Anenii Noi	Hincesti
Anenii Noi	Anenii Noi	Criuleni	Ialoveni
Criuleni	Criuleni	Dubasari	Anenii Noi
Hincesti	Hincesti	Orhei	
Dubasari	Dubasari		Orhei
Straseni	Straseni	Ialoveni	Calarasi
		Straseni	Nisporeni
Calarasi	Calarasi	Hincesti	Straseni
Nisporeni	Nisporeni		Criuleni
Ungheni	Ungheni	Calarasi	Dubasari
		Nisporeni	
		Ungheni	Rezina
Telenesti	Telenesti		Soldanesti
Rezina	Rezina	Telenesti	Floresti
Soldanesti	Soldanesti	Rezina	Soroca
Orhei	Orhei	Soldanesti	
	Floresti	Floresti	

According to this table, scenario A1 differs from scenario A2 only by association of Floresti rayon. Under each scenario, the clusters of rayons in regional zones for waste management are indicated in grey. The scenarios were assessed in order to establish a management system for the rayons at the lowest total cost for the main elements of management, technology, transportation and disposal of waste (see Annex 3).

This analysis took into account:

- The amounts of waste generated by each group of rayons;
- The desired location for a sanitary landfill that will receive waste for storage from all rayons in the cluster;
- Adequate distances on access roads, on which waste will be transported from where they are generated to the sanitary landfill;
- The locations for the transfer stations and the equipment for transportation, taking into account the road infrastructure, in order to ensure the availability of adequate roads.

According to data presented in the table below, the total of 375,673 tons/year of waste will require an adequate management in the DRN and DRC as a total. The options for the management of this amount of waste are described in Scenarios A1, A2, B and C, which correspond to the scenarios presented above. The annual operational costs for managing these wastes vary. The costs are higher for some scenarios than for others.

Scenario A1 was identified as the least costly in terms of transportation and disposal of waste (see Table 4-4). This scenario is in line with the rayon's arrangements, included in the Waste Management Strategy.

The configuration of this management zone was coordinated with the RSWG in DRC during the workshop held in April 2013. Thus, 3 waste management zones were identified for the DRC, which are shown in Table 4-3. For DRC, the waste management will be organized in 3 zones that include LPAs in the following rayons:

- Waste management zone no. 1: Hincesti, Ialoveni, Anenii Noi, Criuleni, Straseni, Dubasari;
- Waste management zone no. 2: Calarasi, Ungheni, Nisporeni;
- Waste management zone no. 3: Rezina, Orhei, Soldanesti, Telenesti.

Table 4-4: Annual Operation Costs estimated for the scenarios (2013)

Scenario	Waste managed annually [tons]	Average total annual operational cost [Euro/an]	Average total annual operational cost per ton [euro/ton]
A1	375,673	9,325,000	24.82
A2		9,435,000	25.11
B		10,551,000	28.09
C		10,889,000	28.99

The cost differences between scenarios are due to the fact that the distances and the costs of transportation vary, the opportunities for costs reduction through transfer stations vary and the waste storage requirements vary too. The A1 scenario seems to be one that involves the lowest cost - that is the scenario that reflects the waste management zones that are recommended in the Waste Management Strategy as those involving the lowest costs among the scenarios that have been assessed. However:

- While the A1 scenario is indicated as the one involving the lowest cost, the cost difference between Scenario A1 and A2 is small;
- In accordance with the legal framework pertaining to the local public administration, LPAs have the main role of deciding whether they want to participate in a regional waste management and with what LPAs they would like to work in this context, if such exist.

Figures 4-2, 4-3 and 4-4 show the clustering of rayons in DRC in 3 waste management zones.

Figure 4-2: Clusters of rayons selected for the management zone no. 1

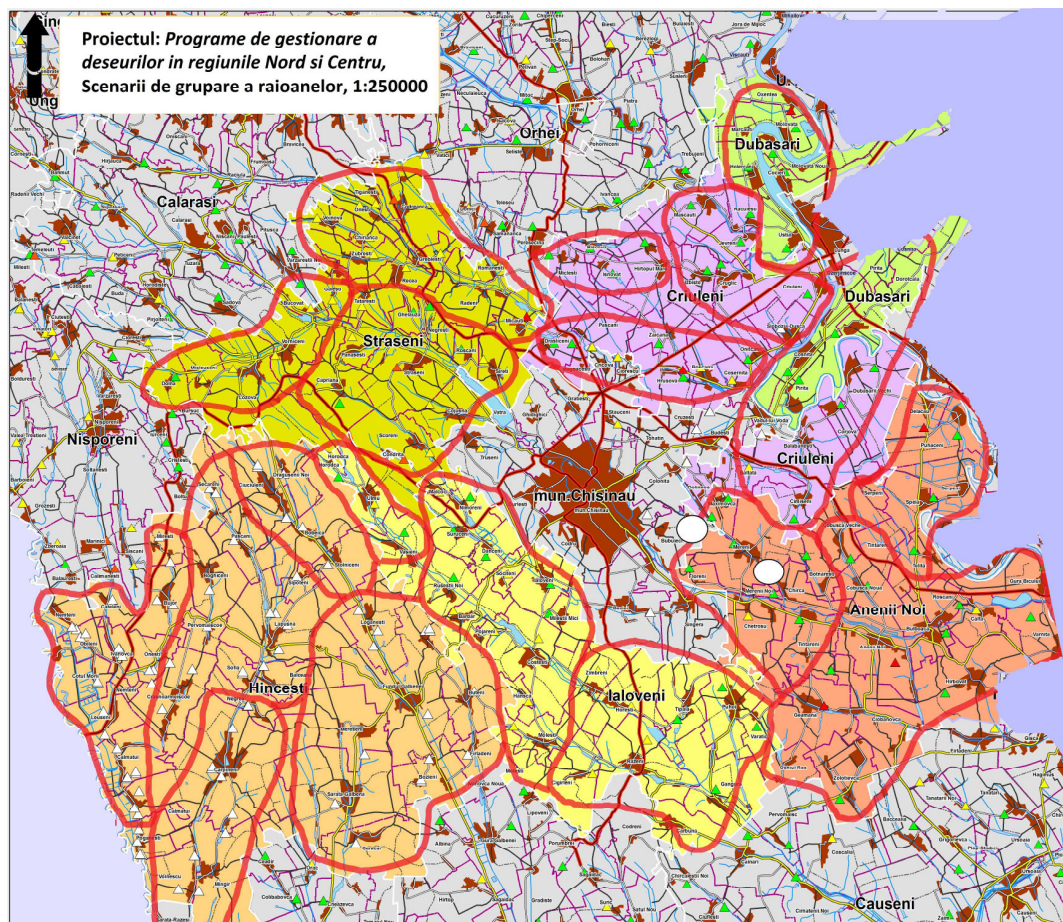


Figure 4-3: Clusters of rayons selected for the management zone no. 2

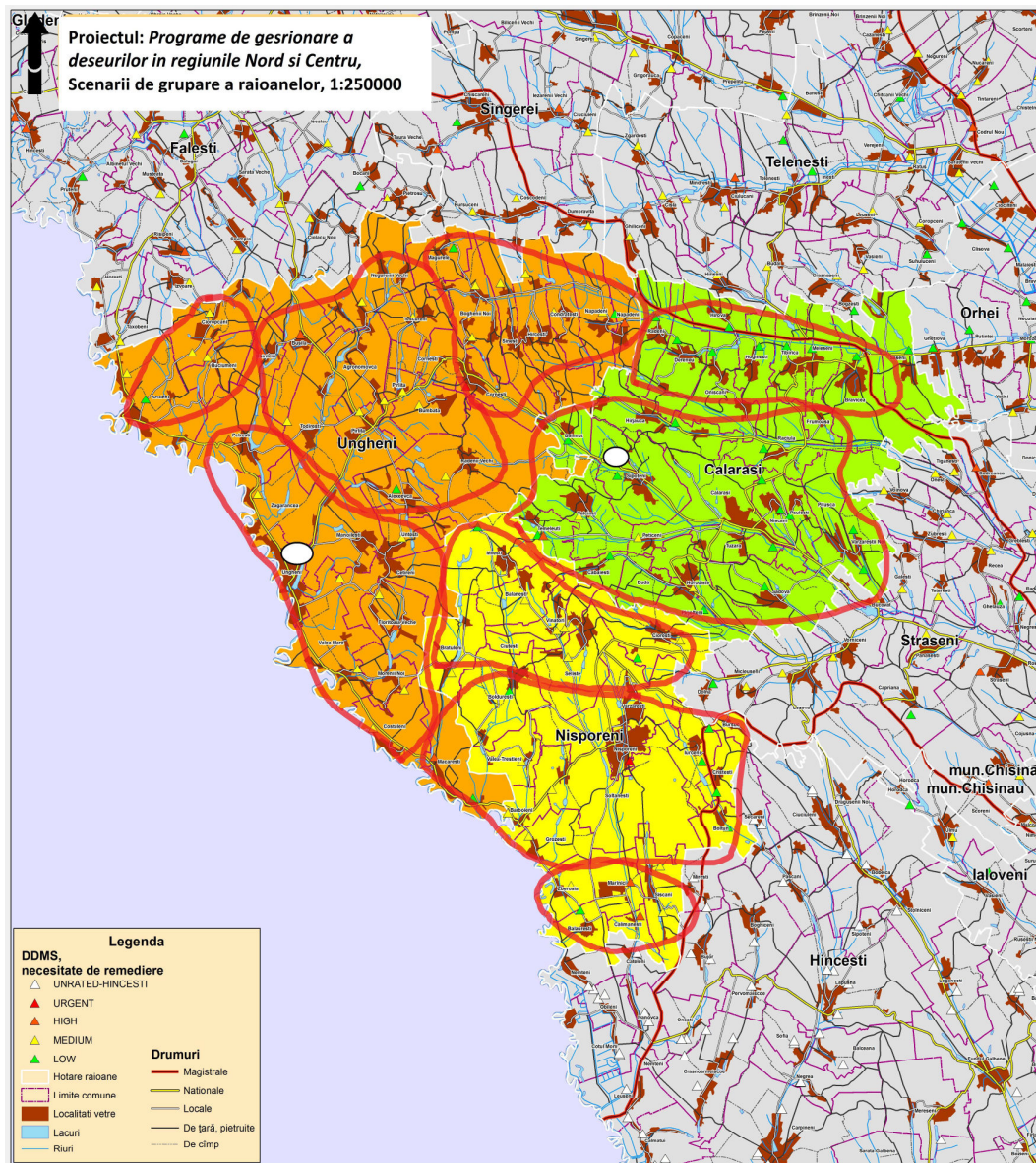
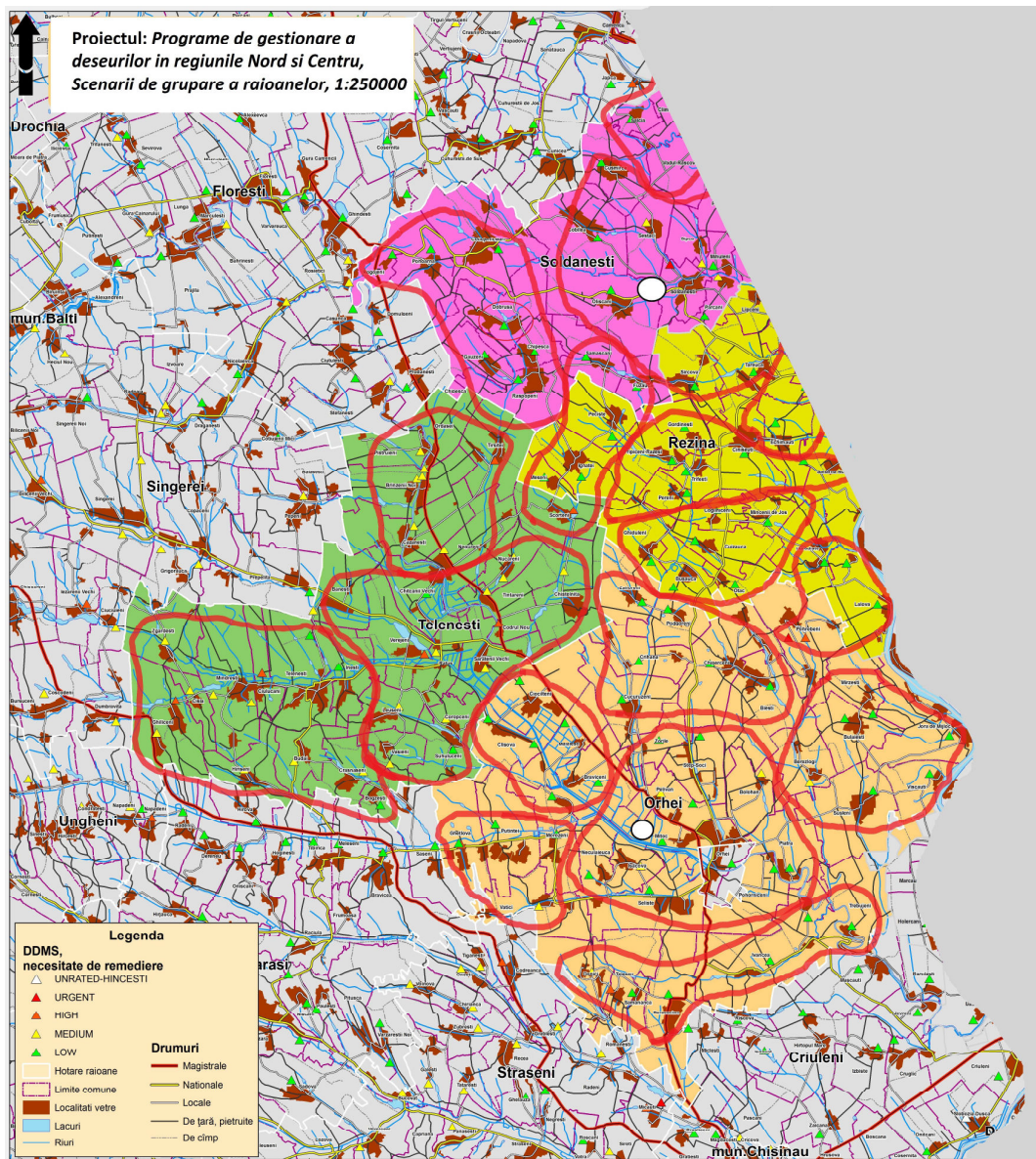


Figure 4-4: Clusters of rayons selected for the management zone no. 3



The implementation of regional plans must be supported by feasibility studies, in order to support the proposed investments. The boundaries of the proposed waste management zones must be checked and, if necessary, adjusted under the arrangements that LPAs can do when initiating feasibility studies.

4.6 Technical and financial assessment of options for selecting the WM Zones

To estimate the costs of activities related to the transfer stations and disposal in a sanitary landfill in the region, technical and financial assessment was carried out for each waste management zone in the region.

The assessment was conducted taking into account the current conditions, the trends in the sector and the desired level of sector development. According to estimates, the costs of waste management activities for clusters of rayons vary against the average shown in Table 4-4.

Thus, table 4-5 shows this cost for transportation and disposal of storage in waste management zones in the DRC. The data in the table concerning the transfer stations and trucks are based on the location of waste generation places and the quantities of waste requiring management activities, taking into account local conditions and road quality.

The data related to investment and operating costs are based on costs that are usually incurred in other relevant jurisdictions.

However, in all cases these are preliminary data, indicated for regional planning and programming purposes, and will be refined once the specific locations for facilities have been established. The preliminary options for landfill sites are identified on the basis of technical and financial analyses, and final locations for landfills will be established at the stage of feasibility studies, depending on environmental legal requirements and other requirements for the placement of landfills, that also require assessment of 3 potential locations for the landfill, in support of the recommendations for each site proposed as a sanitary landfill.

Table 4-5: Estimated costs for activities: waste transfer, disposal in DRC (2013)

Zone	Waste managed annually [tons]	Preliminary options for landfill location	No. of transfer stations	No of necessary long-distance trucks [60 m ³]	Cost of investment [Euro]	Operational cost/ton [Euro]
Zone no. 1	83,370	Merenii Noi	18	5	7,805,400	24.51
		Bubuieci	18	5	7,805,400	24.51
Zone no. 2	47,809	Ungheni	8	2	5,211,900	27.67
		Sipoteni	8	3	5,351,900	28.82
Zone no. 3	51,420	Mitoc	16	2	5,700,800	29.77
		Soldanesti	15	3	5,774,800	30.86

Within the preliminary options, the locations are included for calculation purposes, but the specific locations for the placement of sanitary landfills will be selected at the FS stage. Various technological options for waste treatment have been taken into account for cost assessment. Thus, a set of technical solutions were selected (see Annex 3), that influenced the costs. They were assessed in order to ensure the achievement of the desired levels of waste management in terms of:

- Collection;
- Transfer and transportation;
- Recycling;
- Composting;
- Proper treatment of special waste streams;
- Sanitary storage;
- Mechanical biological treatment.

The process of waste collection for urban areas provides for a system of collection in two bins for separate collection of dry and wet waste fractions. At the same time, the existing system of collecting PET bottles and other plastics bags will be preserved along with them, and will be operated until the end of the useful life of these.

The collection frequency is set to once a day in multi-flat buildings and once a week in private homes. For rural areas the mixed collection in municipal bins of 1.10 m³ is planned. The frequency of collection will be once in two weeks.

In addition to these, nets will be placed for the separate collection of PET and other plastic objects. Separate collection of paper and metals is considered not to be feasible because the paper is used as fuel, and metals end up in the recycling chain through various private collectors.

Table 4-6 and Table 4-7 identify the technical parameters related to the equipment needed for the storage and collection of waste. Table 4-8 identifies the equipment required to implement waste collection in the DRC in accordance with specific technical parameters specified in Table 4-6 and Table 4-7.

Table 4-6: Technical parameters for collection in urban areas

Collection trucks in urban areas	[m ³]	16
Waste density in collection trucks	[ton/m ³]	0.60
Bins for multi-flat buildings	[m ³]	1.10
Bins for private homes	[m ³]	0.24
Waste density in bins	[ton/m ³]	0.15

Table 4-7: Technical parameters for collection in rural areas (2013)

Collection trucks for rural areas	[m ³]	10.00
Waste density in collection trucks	[ton/m ³]	0.60
Bins	[m ³]	1.10
Density of waste in bins	[ton/m ³]	0.15

Table 4-8: Collection equipment required for urban and rural areas

Parameters	Centre region		Urban areas			Rural areas		
	Urban	Rural	Zone no. 1	Zone no. 2	Zone no. 3	Zone no. 1	Zone no. 2	Zone no. 3
1.10 m ³ bins	1,700	11,700	600	600	500	5,900	2,600	3,200
0.24 m ³ bins	94,600	-	32,800	33,000	28,800	-	-	-
Collection trucks	5	14	5	0	0	7	3	4

The table above shows the equipment required for waste collection in DRC. The needs for equipment for waste collection are also divided by urban and rural areas and by various waste management zones. In total, 1,700 bins of 1.1 m³ and 94,600 bins of 0.24 m³ are required for waste collection in the urban areas of the DRC. A total of 11,700 of 1.1 m³ bins are required for the rural areas.

The existing waste storage bins and collection equipment may be used for as long as they are in a good technical condition. These will be gradually replaced and this should be taken into account in the investment plan. For the transfer and long-haul transportation within a zone identified for waste management networks for the transportation and transfer of waste to the landfill will be organized. As a result, it will help reduce pollution and achieve large-scale savings.

Transfer stations are places where waste is transferred from a collection vehicle with low capacity and speed to a vehicle with larger capacity, in order to be transported over long distances. This practice reduces transportation of waste on long distances. Each transfer station will serve several communities. The geographical area served by a transfer station is called “micro-zone”. The specific location of transfer stations depends on the location of the sanitary landfill that serves every waste management zone.

Transfer stations will have a ramp, a concrete platform and a roof. The waste will be discharged from the collection vehicle on the uphill side of the ramp, in a container located in the lower part thereof. All transfer stations will be equipped with the same type of containers. Larger transfer stations located near the cities, will work in two shifts, while the lowest in rural areas will be open eight hours a day or part-time.

Table 4-9 shows the specifications for the transfer stations.

Table 4-10 shows the number of transfer stations that will be needed in each of the three waste management zones in the DRC, together with the necessary equipment, taking into account the waste that has already undergone processing (recycling, composting, etc.).

Table 4-9: Technical parameters for transfer and transport

Long-haul vehicles + trailer's capacity	[m ³]	60
Waste density in long-haul vehicles	[tona/m ³]	0.30
Bins	[m ³]	30

Table 4-10: Equipment required for transfer and transportation

Equipment	Zone no.1	Zone no. 2	Zone no.3
Long-haul vehicles	5	2	2
Bins of 30 m ³	96	40	40
Transfer stations	11	4	6
Tons/year	44,800	18,400	18,600

Tables 4-9 and 4-10 reflect the technical parameters for waste transfer and transport equipment for each waste management zone in the DRC. Thus, a total of about 9 trucks (with a capacity of 60 m³ are needed for transportation of 176 containers (30 m³, to be used in 21 transfer stations in the entire region.

The recycling process provides that the packaging and paper waste shall be collected as fraction of dry co-mixed waste, which will be placed by waste generators in bins, separately from the remaining “wet” fraction. The “dry” waste will be collected separately from the “wet” waste. In addition, “dry” waste will be sorted in order to separate various recyclable materials from others, according to market needs. Equipment for grading, pressing and balloting recyclable materials will also be needed.

Urban transfer stations receiving the materials collected separately by wet and dry fractions will be equipped with a small industrial hall and a grading belt allowing the grading of dry waste. These will be equipped with a hydraulic press, suitable for pressing and balloting items of plastic, paper, non-ferrous metals etc.

Rural transfer stations are expected to be equipped with a small hydraulic press suitable for pressing plastic and a concrete covered platform for the storage of such materials until they are retrieved for further transportation. As result of the grading and baling process, recyclable materials with a market value and a certain percentage of waste will be produced. For the beginning, a 50% yield is expected from the system of segregation and grading from the generator to the compressing unit.

Table 4-11 presents summary information about the recovery of recyclable materials. In total about 6,300 tons of plastics are expected to be recovered for recycling each year, in the DRC, while paper/cardboard are expected to be recovered in a volume of about 7,100 t / year.

Table 4-11: Estimated amount of recyclable materials, urban/rural areas (tons/year-2018)

Centre region	Urban			Rural		
	Zone no. 1	Zone no. 2	Zone no.3	Zone no. 1	Zone no. 2	Zone no. 3
Plastics	1,000	1,000	900	1,700	800	900
Paper/cardboard	1,200	1,200	1,000	1,900	800	1,000
Glass	1,300	1,300	1,200	2,200	1,000	1,200
Metal	400	400	300	600	300	300

The composting process for the regional waste management system is expected to be different for rural and for urban areas.

In urban areas swath composting of green waste from parks and public green spaces will be performed. This will be done using a mobile composter.

The composting process includes unloading of green waste in an assigned place, shredding them and placing in windrows. Aeration is the basic element of the composting process. For this purpose, waste must be loosened by a front loader or a rake machine. The compost shall be made subject to regular tests of temperature and humidity. In order to produce a quality product that will be used for agricultural purposes, it is important to ensure that the materials to be composted do not contain contaminants. Therefore, only green waste will be composted initially.

This composting takes usually between 2 and 6 months and because of a significant loss of water, the weight of the material decreases by 50% compared to the initial mass. The composting of organic materials is not required in the winter, because green waste is not generated in this period of the year.

A concrete composting platform will be built in all urban areas, so that this composting activity can be conducted at the local level. Based on the generated amount of green waste, special mobile composting equipment for the whole region, equipped with a shredder and separator with a production capacity of 40 tons per day, is planned to be purchased for towns.

In rural areas composting of manure and agricultural waste, such as straws, is expected to be conducted. For this purpose, a concrete composting platform will be built at about 0.5-1.0 km way from each village. Equipment with production capacity of 50 tons per day per micro zone is required for the estimated quantities of material to be composted. The set of equipment should include a raking machine and loading machine. No shredder and separator will be needed because these composting plants will not process bulk material.

Table 4-12 presents a summary of the requirements for the composting equipment. Most of the equipment is necessary for the rural areas. The equipment that has been proposed for urban areas is for all 3 waste management zones, for which a composting plan with a capacity of 40 tons / day is recommended. For rural areas about 6 composting plants with a capacity of 50 tons/day are required.

Table 4-12: The amount of waste that must be composted and the necessary equipment – 2018

	Centre region		Urban			rural		
Type of item	urban	rural	Zone no. 1	Zone no. 2	Zone no.3	Zone no. 1	Zone no. 2	Zone no.3
Tons/year	6,100	78,500	2,100	2,100	1,900	39,700	17,500	21,300
Composter 40 TPD	1		1	-	-	-		
Composter >=50 TPD	-	6	-	-	-	3	1	2

Sanitary landfills will be built for each waste management zone. They will be designed, built and operating according to EU standards.

Construction of a sanitary landfill requires specific actions, including: preparation of the foundation and bottom sealing, drainage system, embankment, providing gas collection wells, ensuring quality groundwater levels monitoring wells, open channels for collecting rainwater, leachate collection and leachate treatment equipment installation, fence with a gate that can be locked and additional infrastructure at the landfill, including scale, access roads, buildings and offices.

In the short term, i.e. by 2018, the number of existing landfills must be reduced to 1-3 landfills per rayon. Since 2018, the number of landfills will be reduced to a single landfill per waste management zone (a total of 3 for the DRC), except the local landfill sites that have been built according to environmental law and ensure environmental standards, called transitional landfills, which may continue their operation until their capacity has been exhausted.

The location of the landfill will be established only at a later stage (at the stage of the feasibility study), in line with the environmental impact assessment requirements and other provisions of the legislation in force. The final selection of landfills will be subject to a selection process in the manner established by the legislation. The landfills will be placed according to calculations made at the stage of feasibility studies and may be located in the vicinity of Merenii Noi or Bubuieci (zone no. 1), Ungheni or Sipoteni (zone no. 2), Mitoc or Soldanesti (zone no. 3).

The mechanical biological treatment (MBT) is a technology which is largely used in some EU countries, particularly the Western ones. However, the capital and investment costs may be large, and the markets for recyclable materials after separation in MBT facilities are not sure. The use of the MBT method only for separation of mixed waste for recycling results in a low quality of the recyclable material, which requires additional processing before a market is identified. MBT used for production of fuel from waste is more efficient when the caloric value of waste is high, but it does not apply to Moldova. MBT has been widely implemented in the EU countries, through the pressures emerged in the regulation process, in order to reduce the amount of biodegradable material expected to be disposed in landfills.

The waste MBT before disposal has been implemented in other countries as well (often with the donors' support). Similarly to other cases, the costs of MBT depend on the specific technologies that are selected.

4.7 Technical options for special Waste Stream Management

The RSP provides for management of special waste streams along with the management of municipal waste. As the rates of generation of such waste per capita will continue to increase against the growth of the GDP, the amount of such waste will increase and under the management of a regional system they will require a proper

management according to EU standards. The proper management of such waste implies application of measures for the selection of technologies tested for them, special equipment to ensure the proper management and/or as they have properties hazardous for public health and for the environment. The range of such waste includes waste from construction and demolitions, hazardous household waste and waste electric and electronic equipment (WEEE); waste tires, waste oils, waste batteries and accumulators. Other issues related to the technical options for such waste are presented in Annex no. 3.

Construction and demolition waste. The proper management of such waste will be based on based collected based on calls. In this context, an order based service will be established, by which the generators of such waste will have the possibility to call and request a bin for inert waste, when necessary. The order service will hold an authorization for the management of such waste, according to regulatory acts' requirements that will be developed. It should be considered that a significant part of construction and demolition waste is recyclable, and a certain share is represented by hazardous materials, thus the collection of hazardous waste will be conducted separately from non-hazardous waste.

The construction and demolition waste can be recycled or stored on a site designed for the disposal of inert waste; it can be reused or recycled. The sites for the disposal of inert waste are similar to sanitary landfills, but their construction and operation is less expensive, because of reduction of the negative impact on the environment and hence less needs for environment protection. The sites for disposal of construction and demolition waste under the RSP are expected to be built in the same place with the sanitary landfills for municipal waste. At the stage of the FS these places will be specified based on the amount of such waste in the urban and rural areas.

General hazardous waste is generated in large amounts by household generators, along with household waste. At the stage of RSP implementation this category of waste will have to be subject to a proper management, which means that it must be collected separately from other waste fractions and be sent for treatment to specialized registered companies. The manufacturers, in cooperation with the competent authorities, will establish at this stage a national system for their proper collection and treatment. Transfer stations and sanitary landfills planned under the RSP will be able to serve as temporary storage sites for hazardous household waste, provided that these sites are properly equipped with special containers and their treatment will be related to the established national system.

Waste electrical and electronic equipment (WEEE) is generated in very large quantities by the generators thereof. This category of waste is permanently growing, in line with the technical progress and the sale of such equipment on Moldovan markets.

The management of such waste at the stage of RSP implementation will be conducted in line with a national system established in accordance with the regulatory documents that must be developed. The RSP provides for separate collection of such waste in special bins in transfer stations. As this waste contains valuable recyclable materials and hazardous materials, their proper handling and recycling will be closely tied to the schemes for implementing the extended producer responsibility principle. The collection of such waste could be achieved through national campaigns held once or twice a year. WEEE disassembly (either mechanical or manual) is required before recycling the various parts of this equipment.

Waste oils, used tires, waste batteries and accumulators are generated both by households and by a number of institutions. According to the Waste Management Strategy, the amount of this waste will be constantly growing. At they are hazardous,

these types of waste must be collected separately one from another and from other waste. At the stage of national RSP implementation, measures for waste oils and tires, accumulators and batteries will be developed.

These waste management measures will be closely related to the application of the extended producer responsibility principle. This applies to private sector units and to those responsible for such categories of waste.

4.8 Financial assessment options

Currently, the waste management activities are financed from the central and local budget, from subsidies and charges for the service. No other sources that might be used to cover the costs of waste management service delivery have been identified under the studies. The financial analysis of the system proposed in the RSP included the estimation of capital and operating costs on the one hand and the revenue from tariffs, including revenue from the recycling technologies recommended in the identified waste management zones on the other hand.

The analysis used data related to typical unitary costs and the average data collected from the existing waste management operators at the LPAs level. These data have been obtained through the Centre Regional Development Agency and rayon administrations.

The sector baseline data were used to estimate the operating and the maintenance costs and to calculate the depreciation based on the typical life duration of reviewed equipment and assets. These calculations are used in composing the tariffs applied for service users, in order to ensure the full recovery of costs, but also to maintain the accessibility of the service at the regional level. More detailed information on this issue is presented in Annex 4. The implementation of a regional waste management system in accordance with good international practices requires substantial investment in this area. The general assessment of investment costs took into account the measures envisaged for achieving a regional waste management

The value of investments required to achieve the desired service level as result of the regional system implementation is shown in Table 4-13. These values are related to provision of collection, transfer and transportation services and resource recovery aggregately by 2018. Investment costs include expenditures for landfill capacity conformed to EU standards, which will further ensure the system needs until 2028 (completion of the first two waste storage cells, assuming that the operations will begin in 2018). In waste management zone no. 1 total estimated investments are higher than in the other two zones. The second part of the table presents the investment costs in EUR per ton.

Table 4-13: Investment cost for regional waste management (2013, EUR)

Cost	Waste management zone no. 1	Waste management zone no. 2	Waste management zone no. 3
Total cost of the investments in the new system	13,204,326	8,740,976	9,304,876
Investment cost/tons	246	244	257

In addition to these costs, investment is needed to expand the capacity of sanitary landfills in the planning period 2028-2043, as shown in Table 4-14. The investment recovery is taken into consideration in establishing tariffs for this period. The table shows the investment costs in thousand Euros for regional landfills built in line with EU standards in various waste management areas. For zone no. 1 the investments amount to

EUR 3,511 million, for zone no. 2 the investments amount to EUR 2,904 million, and for zone no. 3 – EUR 2,970 million.

Table 4-14: Investment cost for sanitary landfill development (2013, thousand EUR)

Cost	Waste management zone no. 1	Waste management zone no. 2	Waste management zone no. 3
Extending the landfill capacity between 2028 to 2043	3,511	2,904	2,970

The necessary investment identified in table 4-15 concern closing and rehabilitation of the existing disposal sites. The cost of closing these disposal sites, as it can be seen in the table below, and it is planned that this process would take place gradually over the next 10 years. Investments in closing these landfills are guaranteed in the first year of the investment plan, but later the development of a special tariff-based fund will be necessary. Closing of old waste disposal sites requires a significant investment in all waste management zones. These costs are higher for zone no. 1, which requires EUR 19,872 million, followed by zone no. 3, which requires EUR 11,661 million, and zone no. 2, which requires EUR 10,281 million.

Table 4-15: Investment required for closing waste landfills and disposal cells⁵

Costs	Waste management zone no. 1	Waste management zone no. 2	Waste management zone no. 3
Closing of old landfills and the first stage of waste disposal cells	19,872	10,281	11,661

4.9 Investment plan

Investment planning for the establishment of the regional waste management system is carried out for each waste management zone, for the short-term planning period. Investments are planned in such manner that they follow the planning programs of projects envisaged for implementation in the following 10 years.

Most investments provided for under this planning are expected to be implemented in 2016 and 2017, in order to have an operational system in 2018. Table 4-16 presents the investment plan with the necessary budget (2013, thousand Euro). The table divides the total investments shown in the second column by an implementation period of 4 years. For each zone a budget for a number of pilot projects, is provided, as shown in the third column. It is proportional to the size of the zone and is expected to be spent in 2014 and 2015. The investment program will be conducted in 2016 and 2017.

Table 4-16: Investment Plan (2013, thousand EUR)

Zone	Budget for the new system and closing of landfills	-project budget	2014	2015	2016	2017
Waste management zone no. 1	17,179	1,538	513	1,025	5,876	9,765
Waste management zone no. 2	10,797	0	0	0	3,942	6,855
Waste management zone no. 3	11,637	0	0	0	4,268	7,369

⁵ Note: Waste disposal by 2042 (2013, thousand Euro)

The design, construction of waste management infrastructure, establishment of the regional system in general, will require technical assistance, for which a separate budget is planned. This assistance is calculated depending on the value of investments required for physical infrastructure. The total budget for technical assistance is presented in table 4-17 and is included in the program. The technical assistance budget is presented in the second column of the table, amounting to EUR 1,717 million for zone no. 1, EUR 1,136 million for zone no. 2 and EUR 1,210 million for zone no. 3. In 2014 the feasibility studies are still on-going and technical assistance for implementation will be available from 2015, as indicated in the table.

Table 4-17: Technical assistance budget (2013, thousand EUR)

Zone	Budget	2014	2015	2016	2017	2018
Waste management zone no. 1	1,717	0	924	286	286	220
Waste management zone no. 2	1,136	0	612	189	189	146
Waste management zone no. 3	1,210	0	651	202	202	155

Operational costs assessment is an important element of the financial assessment of the system. The operating costs include a wide range of activities that depend on the level and the technological performance accepted for this system. Annual operating and maintenance costs were assessed for activities related to this system and extrapolated to the amount of waste processed in different activities in different waste management zones. These costs are identified in Table 4-18. The operating and maintenance costs are shown for waste management zones, separately for different services and include costs related to collection, transfer, transport, resource recovery, processing and operation of the landfill. The total for operations and maintenance costs is the sum of these costs, amounting to EUR 3,175 million for zone no. 1, EUR 1,934 million for zone no. 2 and EUR 1,956 million for zone no. 3 per year, as shown in the penultimate row of the table. The operating costs per ton of waste are shown in the last row of the table, ranging between 54-59 Euros per ton.

Table 4-18: Annual operation and maintenance cost (2013, thousand EUR)

Cost	Waste management zone no. 1	Waste management zone no. 2	Waste management zone no. 3
Collection cost	1,308	870	880
Transfer and transportation cost	749	277	268
Resource recovery and processing	714	449	466
Use of landfills	404	338	342
Total operation and maintenance	3,175	1,934	1,956
Specific cost Euro/t	59.34	53.87	54.03

Revenues from non-tariff sources are calculated for dry and pressed recyclable waste fractions, products made from recycling of construction and demolition waste and from compost sale. Revenues planned from other sources than tariffs are identified in Table 4-19. Annual non-tariff revenues are part of the revenues that ensure the recovery of system operation and maintenance costs. Non-tariff revenues amount to EUR 514

thousand for zone no. 1, EUR 387 thousand for zone no. 2 and EUR 367 thousand for zone no. 3.

Table 4-19: Revenue from non-tariff sources (2013, thousand EUR)

	Waste management zone no. 1	Waste management zone no. 2	Waste management zone no. 3
Revenues	514	387	367

Tariffs are an important factor in the rationale for regional system implementation decision and will depend on the costs established for the new waste management services.

These costs will be covered by the users of these services - households and individuals. The recovery of waste management service costs include tariffs and fees paid by users, complemented, if necessary, with subsidies from central and local public authorities. The calculation of fees is also based on the cost of services.

The tariffs will cover all operating costs, including the costs of depreciation and replacement. Also, the cost of establishing a fund for closing landfills and for developing storage cells is added to the operating costs. Table 4-20 summarizes the annual costs to be recovered in order to calculate the tariff. The methodology for tariff calculation is shown step by step in this table. The tariffs shall take into account the costs of operating and maintenance of the modernized system. The costs of taxes will be paid annually and currently amount to 10%, plus the budget to be set for closing landfills. To obtain the total cost, non-tariff revenues presented in table 4-20 all taken into account. Thus, we get the final amounts: EUR 3,414 million for zone no. 1, EUR 2,101 million for zone no. 2 and EUR 2,153 million for zone no. 3.

Table 4-20: Costs taken into account for tariff calculation (2013, thousand EUR)

Costs	Waste management zone no. 1	Waste management zone no. 2	Waste management zone no. 3
New system operating and maintenance costs	3,175	1,934	1,956
Including costs related to payment of profit tax, property taxes and other taxes - 10%	3,493	2,128	2,153
Including reserve for closing landfills and opening new cells	3,929	2,488	2,520
Cost with non-tariff revenues	3,414	2,101	2,153

Three different scenarios are taken into account for the costs of funding:

- 100% funding from grants;
- Preferential loan for a term of 25 years with an interest rate of 3% (possibly negotiated with an international financial institution);
- Loan from a private bank for a 25-years period, with 9% investment rate (commercial rate that can be available for the private sector). All three scenarios imply that the technical assistance, which is part of the implementation process, will be financed from a grant or the state budget.

The affordability level is expected to be of about 1.2% of income per capita, according to international affordability reference values. To reach operating costs and revenues relevant to the situation in 2018 (i.e. the first year of activity), an increase of 2.5% is expected in both the expenditure and revenues. According to Table 4-21, the tariff to be paid for the new waste management system is designed as follows:

- In the first waste management zone it will amount to about. 7.75-11.03 €/person/year (approx. 132-188 lei / person / year), depending on the funding scenario;
- In the second waste management zone it will range between 9.16-13.12 €/person/year (approx. 156-224 lei/person/year), depending on the funding scenario;
- In the third waste management zone it will range between 8.36-12.16 /person/year (approx. 143-207 lei/person/year).

Table 4-21 also shows the affordability degree of the waste management system for private homes owners. As shown in the table, 1.2% of income per capita is equivalent to € 13.42 / person / year (approx. 228 lei / person/ year). In all cases the annual cost of the waste management system is smaller than the actual affordability criteria. Therefore, it can be concluded that the waste management system is affordable at the local level in each of the analysed funding scenarios, although it is obviously much more affordable in scenarios with lower interest rates.

Table 4-21: Macro-tariffs and affordability (2013, EUR)

Macro-tariffs per capita per year	Grant funding	3% interest rate	9% interest rate
Zone no. 1 Waste management zone	7.75	10.08	11.03
Waste management zone no. 2	9.16	11.98	13.12
Waste management zone no. 3	8.36	11.05	12.16
Available budget per capita per year 1.2% of income per capita	13.42		
Waste management tariff as percentage of the affordability criterion	%	%	%
Waste management zone no. 1	57.76	75.12	82.21
Waste management zone no. 2	68.28	89.24	97.80
Waste management zone no. 3	62.26	82.38	90.59

Cost recovery mechanisms to reach a 100% affordability and resource recovery level, tariffs will be differentiated for individuals and businesses. Hence:

- Legal entities, including institutions and businesses will pay more than households; and
- Urban households will pay more than rural households as urban households will benefit from a higher level of service (higher frequency of collection). This factor is not in contradiction with the cost recovery principle of the existing waste management systems.

Table 4-22 shows a differentiation between urban and rural households. If legal entities will pay for waste management services at a higher rate than households, the tariffs for households may be reduced even more.

Table 4-22: Urban and rural tariffs/household/month (2018, EUR)

Tariffs/household/month	Urban			Rural		
	Grant funding	3% interest rate loan	9% interest rate loan	Grant funding	3% interest rate loan	9% interest rate loan
Waste management zone no. 1	2.05	2.66	2.91	1.65	2.14	2.35

Tariffs/household/month	Urban			Rural		
	Grant funding	3% interest rate loan	9% interest rate loan	Grant funding	3% interest rate loan	9% interest rate loan
Waste management zone no. 2	2.42	3.16	3.46	1.86	2.44	2.67
Waste management zone no. 3	2.21	2.92	3.21	1.91	2.49	2.73

To maximize the payment rates, various cost recovery methods and payment enforcement methods can be applied. One of the possible options is unification of tariffs for waste management, by including them in the same bill with those for other utilities (e.g. for water supply). In such case the payment can be done to a relevant administrative entity for waste management or a utility entity that will transfer the charges for waste management to the administrative entity relevant for waste management or a utility entity, against an additional charge for such services. Other options can also be identified. These mechanisms will be promoted by the specialized CPA.

Another option is the collection of taxes by public administrative entity or a special agent who goes from one household to another to collect taxes, or by setting up offices where households and legal entities can pay their bills.

In such cases, the enforcement of the payment mechanism should be ensured by the administrative entity, as operators have few levers to control the payments. Moreover, the operators must continue supply the service even in the event of non-payment, in order not to allow accumulation of waste and thus environment and health problems. Thus, the administrative authority has most means to control the payments through administrative and fiscal measures.

The financing and the additional revenues are provided through a system of economic tools. The most important of these is the extended producer responsibility.

4.10 Institutional options

To support the regional approach to waste management, there should be an appropriate institutional framework. The adequate structure must take into account:

- LPA multitude in waste management zones;
- The legal, political and policy framework for local public services and waste management;
- The functions that must be performed to achieve efficient waste management services;
- LPAs in each management zone.

LPAs in each waste management zone in a regional waste management system will share the infrastructure and the waste management facilities and will be responsible for planning, implementation, operation and costs associated with these facilities. Accordingly, inter-municipal cooperation (ICM) is required in accordance with the legal provisions for cooperation between LPAs.

Based on the political, legal and regulatory framework on waste management, two general functions are needed to support the regional waste management:

- Administrative functions. These functions include decision making, planning, administrative management, tariff policy formulation and implementation, waste management performance monitoring, service contracting (where applicable), resource records, communication and similar functions;

- Service delivery functions. These functions include operational tasks related to waste management services provision.

The first category of functions is close to the LPA council functions while an LPA organizes its waste management on its own territory. The second category of functions is close to the functions provided by a service provision agent, such as a municipal company or other entities belonging to municipalities or a private contractor.

4.11 Forms of cooperation

Inter-municipal cooperation (IMC) is supported by the political, legal and regulatory framework, under which the IMC can provide local public services. IMC can take different forms. A proper form of the IMC is specific to the circumstances of LPAs participation. The Waste Management Strategy refers to and recommends the “Associations” as a proper form for some functions. In parallel, other forms of IMC can be taken into consideration for service provision functions, including joint ventures, municipal enterprises and other forms of organization, in order to obtain benefits from the participation of LPAs.

The appropriate form of cooperation for each waste management zone will be established jointly with LPAs in the examined zone/region, at the FS phase.

4.12 Waste Assets Management in the transition period

A number of LPAs have recently invested in new infrastructure and equipment for waste storage, collection, recycling and/or treatment and may have other waste management assets according to the legislation in force. These LPAs can continue using the assets after accepting the regional waste management system as long as these assets are functional, after which these LPAs can join the regional system.

After accepting the RSP, 1-3 landfills will be assigned in each rayon, with improved transitional landfill sites, that will continue to function until a new sanitary landfill for all rayons in the waste management zone is built, according to the current environmental laws and EU requirements. These sites will be organized in operated in a manner that ensures mitigation of impact on the environment. The environmental impact of these sites will be assessed and cost effective measures to improve the environment will be identified.

All sites identified as IWTS will have to meet the provisions established in the typical technological plan for solid waste management landfills, approved by the order of the Ministry of Environment and Landscaping no. 67 of 02.05.2001, or implement a mechanism for the mechanical biological treatment of waste (see below), in order to stabilize organic waste and hence reduce the negative impact of waste on the environment in the landfill sites. Identification and operation of these sites as IWTS is a temporary measure that does not reduce the need for developing modern waste storage facilities in line with EU requirements.

Waste treatment by the mechanical biological method (MBT) before disposal can be an efficient approach for reducing the environmental impact of waste that requires disposal to improved transit waste storage sites. A pilot MBT project is planned to be implemented in Soldanesti, in an IWTS, in order to demonstrate the technical and financial needs of this approach. The results and the lessons learned, related to this pilot project, can be later disseminated and applied in other areas.

At the stage of the feasibility study a schedule for closing the existing landfills (other than IWTS) will be developed. The schedule will reflect what is achievable in technical and environmental terms, as well as the timeframe for closing these sites.

All closed landfills will require rehabilitation. In some cases certain landfills might be used as location for transfer stations that will continue to serve the needs of the regional waste management system.

The existing contracts will be adjusted as necessary, when the regional waste management system starts operating. This may require amendment of existing contracts (collected waste will be taken to a transfer station instead of a local landfill). The contracts can also be reorganized into a larger contract that covers one of the necessary services at the regional level, under a new waste management system. If necessary, some adjustments can also be made.

The actions taken at the national level in order to facilitate implementation of a waste management system include the following:

- Closure of landfills that do not meet the environmental requirements;
- After the local landfills are closed, the interdiction of waste disposal in unauthorized landfills will apply and the waste will be managed through the regional waste management system, including through IWTS;
- After this regional program has been approved, 1-3 IWTS will be selected in each rayon, with appropriate approval by the specialized central public administration authority. These locations will be able to operate before modern sanitary landfills have been built according to EU standards, and after this IWTS will be closed and rehabilitated;
- Approval of landfills which have been designed in accordance with the laws and standards equivalent to those in the EU;
- Adoption of the new Law on waste, the regulatory framework that provides a clear and unambiguous legal basis to ensure the sustainability of the regional waste management;
- Ensuring that all initiatives that are funded from various investment funds contribute to the regionalization of waste management activities, the priorities in this context should include allocation of funds for the establishment of IWTS;
- Revision by entities of commitments assumed under the existing contracts, particularly concession contracts, for delivery of specific services, since they can be significantly affected by amendments to the legal framework and the applied standards. Long term tariff agreements, based on the undertaken service standards, might not be adequate for the management of new facilities or services, that are necessary as result of new approaches and environmental or performance standards. As a result, achievement of modern waste management standards may require their renegotiation or cancellation, and higher costs resulting from high standards can help raise the awareness of the community about the need to participate in the waste management system;
- Adopting of waste management standard in line with those of the EU.

Problems taken into account in development and, hence, implementation of the RSP in the DRC include the following:

- Delimitation of preferred waste management zone is a technical exercise, which however requires agreement of key stakeholders: communities and rayons that will include identified groups. To reach an agreement, the stakeholders must:
 - Understand the benefits of collaboration within a zone; and
 - Agree on analyzes that lead to identification of waste management zones.
- The costs of waste management should be accessible to communities. In rural areas communities might have never had any waste management service in the past, but they may be willing to pay for a service that was not delivered before. Therefore, adequate financial technologies that have been demonstrated in similar conditions and the cost structures of which are well known and predictable in the context of the Republic of Moldova and the DRC are necessary;
- Selection of a location for the placement of infrastructure elements for the regional waste management system (regional sanitary landfill, transfer stations, composting plants, recycling units etc.);
- Identification of appropriate institutional mechanisms. Two aspects are crucial in this respect:
 - Communities/rayons do not have a tradition of cooperation in providing public services and therefore will require institutional arrangements that include mechanisms that establish and strengthen trust between communities / rayons;
 - The range of investments will have to be absorbed by associated organizational structures, modified as necessary in the institutional arrangements for the RSP.

5 Plan of measures and activities

5.1 Measures and activities to be undertaken

The measures and activities to be undertaken for the successful implementation of a waste management system at the regional level, according to EU standards and norms, are derived from the following objectives:

- Strengthening the political, legislative and regulatory framework;
- Strengthening the institutional framework at regional level;
- Developing waste management infrastructure at the regional level;
- Informing, raising public awareness of the need for waste management at the regional level.

Measures and activities related to the implementation of the RSP are included in Annex 5 to this document.

The schedule of RWMP implementation includes time-based actions.

The plan for RWMP implementation is described in Table 5-1.

Table 5-1: Plan of Measures and Activities for RSP implementation

Action	2013	2014	2015	2016	2017	2018	2019	2020
Preparing the regional program								
Approval of the regional program and the program fiche								
Preparing the feasibility study/EIA								
Approving the feasibility study/EIA								
Obtaining the authorizations for land use								
Institutional development								
Strengthening the legal framework								
Financing agreement								
Preparing the project documents								
Approval of project documents								
Procurement of equipment								
Construction								
Operations								

As this table shows, the Plan of Measures and Activities identifies the timeframe within which the RSP for waste management can be implemented. This period is between mid-2013 and the end of 2017, in order for the new waste management system to be able to start the activity by early 2018.

The steps that are needed to achieve this time frame will be taken according to a standard timetable.

At the same time, for the period of waste management system development specific measures are planned for the short term, indicated in the Plan of Measures and Activi-

ties in this document (Annex 5), that will help achieve the specific objectives for the Waste management RSP.

In order to attract investment from various funding sources, both domestic and foreign, 3 system project concepts will be developed for the implementation of the abovementioned Plan of Measures and Activities. These concepts will contain the description of specific data related to each waste management system for each zone, as identified in the RSP.

The RSP shall be approved by the Regional Development Council.

Feasibility studies and environmental impact assessments are documents to be developed in order to implement the decisions to invest in the new waste management system in every waste management zone. The legal framework provides that the selection of a landfill must meet the requirements of legal and regulatory acts in this area, including those related to EIA. Therefore, EIA must be integrated in the feasibility study, as at this stage the location of sanitary landfills in each waste management zone will be selected. The development of the feasibility study and the EIA will begin immediately after approval of the RSP for waste management. Feasibility studies and the EIA will be completed in Q2, 2015.

Feasibility studies and EIA will be submitted to the central public administration authorities, responsible for approval of these documents in the manner established by law. These documents are expected to be approved in Q2, 2015.

Permits for land use are obtained in accordance with the provisions of the national law, while the conditions for the location, design and construction of landfills shall meet the EU and other international experience, as well as the requirements for landfills' location in Moldova.

The surface of the land required for such purposes will have to be established at the stage of the feasibility study. However, the selected land is classified mainly as "agricultural" or may be private and in this case the process of changing the purpose of the land must be initiated, as well as a process of obtaining authorization of the use of this land for the location of the landfill, in order to be able to build the landfill infrastructure. This process is expected to be completed by the end of Q4, 2014.

Relevant local and regional public authorities, in cooperation with relevant national institutions are responsible for the selection of the land, obtaining of necessary permits for its use for placing sanitary landfills.

Institutional development can take place immediately after completion of waste management RPS and its approval by the Regional Development Council.

Strengthening the legal framework in support of implementation of the RSP for waste management will continue. It is expected that the new law on waste may be approved in Q2, 2004. Also, regulatory acts addressing waste management standards will have to be developed jointly with the extended producer responsibility requirements and supervision of waste management system.

Local authorities will be responsible for creating the necessary institutional arrangements. The Regional Development Agency will be responsible for coordinating this process and for collaboration with the public authorities in rayons and communities, in order to achieve the establishment of the necessary institutional arrangements.

The central public administration authority for environmental protection will be responsible for strengthening the legal framework for the waste management sector.

It is expected that the implementation of waste management RSP will require funding from external sources, which may be provided by a single donor or a group of donors or international financial institutions. This will require negotiation of a financing agreement based on results of the feasibility study. Completion of necessary financing agreements is planned for the end of Q3 2016.

The Government of Moldova through the Ministry of Regional Development and Construction and the Ministry of Finance will be responsible for ensuring the availability of financial resources needed to implement this RSP for waste management in collaboration with the Centre RDA.

The project documentation will comprise the detailed project and technical specifications for equipment, that will be necessary for building the facility and purchasing equipment. Project documents will be developed through a public bidding that will start immediately after completion of the financing agreement. These documents will be prepared by an international and a national company with experience in detail design of waste management infrastructure according to EU standards.

This activity will be completed by the end of Q3, 2016, and the approval of documents will be complete by the end of Q4, 2016.

The procurement of equipment and the construction process will be implemented in accordance with the bidding procedures. Completion of both processes is expected for the end of Q4 2017.

Both procurement of equipment and the construction works will be conducted based on a corresponding bidding process. The necessary supervision and reporting support in procurement of equipment and constructions will be provided by an international company with experience in implementation of waste management infrastructure according to EU standards. This support will be provided in accordance with the provisions concerning the technical assistance of the Financial Agreement.

Measures and actions described above will enable the new waste management system in the DRC to start its operations in early Q1 2018.

The implementation of the RSP for waste management in accordance with the identified program is subject to the following risks:

- Legal uncertainty;
- The time required for the activities;
- Public opposition;
- Delay in approvals;
- Political instability.

6 Monitoring, evaluation and reporting of RSP implementation

RSP is to be implemented through the Plan of Measures and Activities, approved as an annex to it.

The Plan of Measures and Activities serves as a basis for operational programming and promoting of projects for funding in order to achieve the overall and the specific objectives of the RSP. Deadlines and indicators, by which the degree of implementation of actions will be checked, are shown in Annex 5.

The activities included in this RSP, which will be included as measures planned for implementation in regional operational plans will be monitored and evaluated according to the requirements of these documents.

The responsibility for RSP implementation will lie with all institutions with corresponding competences, identified in the Plan. At the same time, to ensure consistent implementation of the RSP, mechanisms, efficient and result based monitoring/evaluation instruments will have to be developed within the regional policy documents (e.g. monitoring and evaluation plans with clear specification of expected outcomes, progress indicators, baseline data), with participation of national and regional institutions and key stakeholders, including the LPA. The evaluation of RSP implementation is recommended to be conducted at the middle and at the end of RSP implementation.

In the process of monitoring regional policy documents, monitoring reports will be developed (quarterly/annually) on the progress of implementation of actions and achieving the expected results, according to provisions established for reporting on the implementation of regional policy documents, which will ensure the required transparency.

Under the implementation of objectives and actions set out in the RSP, the responsible institutions will be guided by performance and progress indicators set out in these. In accordance with the specific objectives of the RSP, the following preliminary monitoring indicators are proposed:

- Changes in the national legal and normative framework on waste management - number of approved documents;
- Establishment of institutional arrangements - the number of operators active in the field of waste management;
- Creation of systems for collecting/processing data on waste management - regional statistical system established;
- Development of waste management infrastructure at the regional level - regional system established (number of transfer stations built, sanitary landfills built, number of closed landfills);
- Information, raising awareness of waste treatment and disposal facilities - the number of programs, public awareness campaigns, the number of informed people, and the number of NGOs concerned with waste management.

Annexes

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Annex 3	Technical evaluation of the options
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Annex 5	Plan of measures and activities for Waste Management RSP implementation
Annex 6	Methodology for projects portfolio identification

Annex 1: Waste Management Profile of DRC rayons

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1 Calarasi rayon

1.1 Geographical position

Calarasi rayon is located in the Central-Western part of Moldova, on an area of 753.5 km² and borders Nisporeni rayon to the South-West, Orhei - to the East, Ungheni - to the West and Straseneni - to the South-East. There are 3 small rivers flowing through the rayon - Bic, Ichel and Cula.

Figure 1-1: Geographical Position of Calarasi rayon



Table 1-1: Data about Calarasi rayon

Data about the rayon			
	Urban	Rural	Total
General information			
Population [pers] (NBS data)	16,200	62,600	78,800
Number of villages/localities	1	27/43	28/44
Existing sanitation services			
Calarasi	1	-	1
	-	1	1
Existing landfills			
Number of existing landfills	1	51	52
Landfills' extension capacity	-	Tuzara Hirova	2
Generated/disposed waste			
Generated waste (t/year)	4,373	11,977	16,349
Technical endowment of the waste management sector			
Garbage trucks	4	1	5
Tractor trailer	2	-	2
Excavator	1	1	2
Bulldozer	1	1	2
Motor grader	1	1	2
Financial aspects of sanitation services			
Number of services	1	1	2
Average tariff for services (lei/month)	Data are not available	Data are not available	Data are not available

1.2 Existing waste management system

The waste management infrastructure includes a large number of waste dumps, located in each village, and some villages even have several waste disposal sites. These dumps do not meet the location and organization requirements. Some of them are located in the former water storage basins (Bravicea village, Hodinesti village, Hirova village, Radeni village), sand quarries (Horodiste village), water protection areas (Temeleuti village), warehouses for chemical substances (Meleseni village, Bahmut village). These dumps are not fenced, the compaction technology is not complied with, and no security service is available. There are two sanitation services registered in the rayon, the technical equipment of which may ensure collection and transportation of waste from several localities. Waste is collected in a mixed manner and is transported to the existing landfills. Separate collection of PET is conducted partially by companies. The population of villages that are not covered by services transports the waste by its own vehicles, which do not meet any environment protection standards.

In Calarasi town, construction of a facility for recyclable materials grading was planned with the NEF support, but it has not been implemented yet.

Landfills with potential expansion capacities to other localities can be found in Tuzara and Hirova villages.

Urgent actions for reanimation of environment as result of the impact caused by waste management are required in landfills in Temeleuti and Pitusca villages. The landfill in Calarasi requires reorganization.

1.3 Service providers

Currently, sanitation services exist in Calarasi and Oniscani towns. Calarasi Sanitation Service has the capacity for expansion of services to other localities. The responsibility for the maintenance of existing services lies with the local public authorities in these localities.

1.4 Key challenges

The development of waste management infrastructure in Calarasi rayon is planned to take place within the waste management zone, comprising Nisporeni and Ungheni rayons, according to the preferred scenario within the regional planning and the Waste Development Strategy, approved by GD no. 248 of 10.03.2013.

The key challenges are:

- Association of local public administration authorities for waste management in the entire waste management zone, according to the new approaches to sector development at the regional level;
- Construction of a single landfill and creation of infrastructure related to the waste management zone.

1.5 Development prospects

The development prospects are associated with improved quality of sanitation services in Calarasi rayon. These will be accomplished while achieving the sector development targets under the Regional Waste Management Program for the DRC, focusing on short-, medium- and long-term objectives.

The objectives focus on issues related to population coverage with waste collection services, packaging and organic waste resource recovery and issues related to specific waste stream management, while at the same time strengthening the institutional ca-

pacities at the level of the waste management region/zone and the relevant legal framework.

1.6 Sector development vision

By 2017, the conditions required for access to safe sanitation services will be provided in Calarasi rayon for 100 per cent of the urban population and 75 per cent of the rural population. Also, recovery of packaging waste resources and treatment of specific resources will be ensured, as well as development of regional infrastructure for the collection, transfer and transportation of waste (transfer stations) in the zone, reduction of the existing landfills to 1-3 per rayon and improved locations for the transition period.

By 2022, but also later, the rayon's performance must reach about 100 per cent or rural and urban population coverage with improved services of organic and packaging waste recovery, specific waste treatment and a single sanitary landfill must be operated jointly with the cluster of rayons associated in the management zone. All these will result in improved services and living standards and will ensure sanitary and environment conditions for the entire rayon.

2 Criuleni rayon

2.1 Geographical position

Criuleni rayon is located in the western part of the country, close to the capital of Moldova, along the right bank of the Dniester River. It neighbours Orhei rayon to the north and Anenii Noi to the south. The rayon has groundwater sources. The surface of the rayon is about 688 km².

Figure 2-1: Geographical position of Criuleni rayon

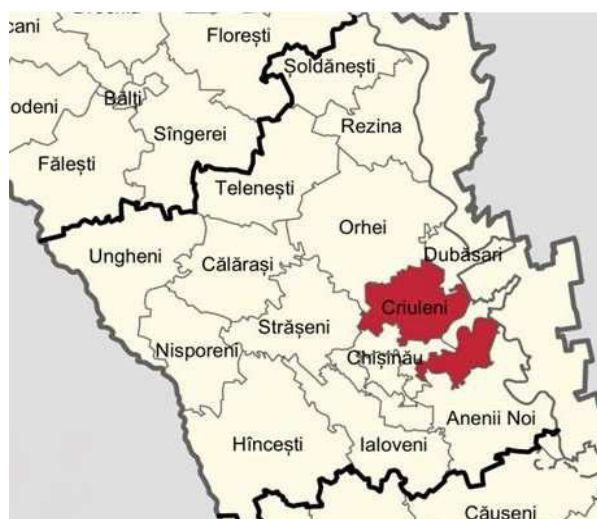


Table 2-1: Data about Criuleni rayon 2

Data about the rayon			
	Urban	Rural	Total
General information			
Population [pers] (NBS data)	8,300	64,800	73,100
Number of villages/localities	1	24/43	25/44
Existing sanitation services			
Criuleni	1	-	1
	-	2	2
	-	2	2
Existing landfills			
Number of existing landfills	1	30	31
Landfills' extension capacity	-	Hrusova Raculesti Pascani	3
Generated/disposed waste			
Generated waste (t/year)	2,227	12,456	14,682
Technical endowment of the waste management sector			
Garbage trucks	1	1	2
Tractor trailer	1	5	6
Financial aspects of sanitation services			
Number of services	1	4	5
Average tariff for services (lei/month)	Data are not available	Data are not available	Data are not available

2.2 Existing waste management system

The waste management infrastructure in the rayon is extremely poorly developed. The rayon has the technical equipment for collection and transportation in Criuleni town and partially in four villages. The technical equipment is insufficient. Waste is collected in a mixed manner and is transported to the existing landfills. Separate collection of PET is conducted partially by companies. The population of villages that are not covered by services transports the waste by its own vehicles to dump sites that do not meet any environment protection standard and such dumpsites are located chaotically in nearly each locality. Criuleni rayon is one of the rayons that have not benefitted of projects financed from other sources, except for Criuleni town, which benefitted of sources from the NEF for organizing the existing landfill and organizing the landfill in Jevreni village. The landfills existing in the rayon's localities are not authorized and arranged according to requirements. Most landfills are located with violations of regulations in force, including on slopes. The non-complying landfills must be closed. The compaction technology is not observed in the existing landfills. Landfills are located differently in the rayon, e.g.:

- In manure tanks (Zaicana village);
- Clay quarries (Dubasarii Vechi village, Hrusova village);
- On the territory of the former treatment plant (Jevreni village);
- At unacceptable distances to residential areas (Izbiste village, Hrusova village).

If necessary, landfills in Hrusova, Raculesti and Pascani villages may have expansion capacities. There are no landfills that would require urgent actions, but overall, all of them must be improved and some of them closed.

2.3 Service providers

Currently, sanitation services exist in Criuleni town and other four localities, such as Dubasarii Vechi, Balabanesti, Corjova and Baltata. The responsibility for operation and maintenance of existing services lies with the local public authorities in these localities. The sanitation service in Criuleni town might be extended in order to provide services to other localities as well, such as Slobozia and Oniscani, if the existing potential is strengthened.

2.4 Key challenges

The development of waste management infrastructure in Criuleni rayon is planned to take place within the waste management zone, comprising Hincesti, Ialoveni, Anenii Noi, Straseneni and Dubasari rayons, according to the preferred scenario within the regional planning and the Waste Development Strategy, approved by GD no. 248 of 10.03.2013. The key challenges are:

- Association of local public administration authorities for waste management in the entire waste management zone, according to the new approaches to sector development at the regional level;
- Construction of a single landfill and creation of infrastructure related to the waste management zone.

2.5 Development prospects

The development prospects are associated with improved quality of sanitation services in Criuleni rayon. These will be accomplished while achieving the sector development

targets under the Regional Waste Management Program for the DRC, focusing on short-, medium- and long-term objectives.

The objectives focus on issues related to population coverage with waste collection services, packaging and organic waste resource reclamation and issues related to specific waste stream management, while at the same time strengthening the institutional capacities at the level of the waste management region/zone and the relevant legal framework.

2.6 Sector development vision

By 2017, the conditions required for access to safe sanitation services will be provided in Criuleni rayon for 100 per cent of the urban population and 75 per cent of the rural population. Also, recovery of packaging waste resources and treatment of specific resources will be ensured, as well as development of regional infrastructure for the collection, transfer and transportation of waste (transfer stations) in the micro-zone, reduction of the existing landfills to 1-3 per rayon and improved locations for the transition period.

By 2022, but also later, the rayon's performance must reach about 100 per cent of rural and urban population coverage with improved services of organic and packaging waste recovery, specific waste treatment and a single sanitary landfill must be operated jointly with the cluster of rayons associated in the management zone. All these will result in improved services and living standards and will ensure sanitary and environment conditions for the entire rayon.

3 Dubasari rayon

3.1 Geographical position

Dubasari rayon borders Criuleni rayon to the west, the Transnistrian region (Ribnita rayon) to the North and Grigoriopol rayon to the south. The surface of Dubasari rayon is 309 km². Dubasari rayon is crossed by the Dniester River.

Figure 3-1: Geographical position of Dubasari rayon



Table 3-1: Data about Dubasari rayon

Data about the rayon			
	Urban	Rural	Total
General information			
Population [pers] (NBS data)	-	35,200	35,200
Number of villages/localities	-	11/15	11/15
Existing sanitation services			
Dubasari	1	-	1
Cocieri	-	1	1
Existing landfills			
Number of existing landfills	-	11	11
Landfills' extension capacity	-	Ustia Molovata Cocieri Dorotcaia	4
Generated/disposed waste			
Generated waste (t/year)	-	6,745	6,745
Technical endowment of the waste management sector			
Garbage trucks	1	2	3
Tractor trailer	1	1	2
Financial aspects of sanitation services			
Number of services	1	1	2
Average tariff for services (lei/month)	Data are not available	Data are not available	Data are not available

3.2 Existing waste management system

In the 11 localities of Dubasari rayon there are landfills, of which one (Cocieri village) is authorized. A significant part of the solid waste landfills fail to meet the requirements. The land plots are selected by mayors and coordinated with the rayon's environmental service. Most landfills are located with violations of regulations in force. All landfills subject to inventory have access road (either gravel or dirt road, rarely driveway). Some landfills are located in the former silage pits (Holercani village) or clay quarries (Dorotcaia village). The landfills do not have embankments and are not guarded. There are two sanitation services registered in the rayon, the technical equipment of which may ensure collection and transportation of waste at the rayon level. Currently, waste is collected in a mixed manner and is transported to the existing landfills, which is a violation of environment protection requirements. Urgent needs are required for remediation of some landfills (Cosnita and Oxentea villages). With the support of NEF and UNDP, a project was implemented in Cocieri village for construction of a SWL for Corjova, Cocieri, Molovata Noua and Vasilevca villages, to be served by the Intermunicipal Sanitation Service in Cocieri village. Earlier (2008-2009), projects for building dumpsites and procuring special equipment and machinery for waste transportation and for establishing an inter-municipal service for sanitation and use of solid household waste were implemented in the rayon. In 2004-2009 the rayon benefitted of a number of projects for construction/equipment of landfills in Oxentea and Ustia/Molovata.

3.3 Service providers

Currently, sanitation services exist in Dubasari town and Cocieri village. Considering the investment attracted under the projects designed to improve the quality of the sanitation services (Cocieri village), it can be said that there are capacities for extending this service to other localities as well. The responsibility for the maintenance of sanitation services in the rayon lies with the local public authorities.

3.4 Key challenges

The development of waste management infrastructure in Dubasari rayon is planned to take place within the waste management zone, comprising Hincesti, Ialoveni, Anenii Noi, Strasenii and Dubasari rayons, according to the preferred scenario within the regional planning and the Waste Development Strategy, approved by GD no. 248 of 10.03.2013. The key challenges are:

- Association of local public administration authorities for waste management in the entire waste management zone, according to the new approaches to sector development at the regional level;
- Construction of a regional landfill and creation of infrastructure related to the waste management zone.

3.5 Development prospects

The development prospects are associated with improved quality of sanitation services in Dubasari rayon. These will be accomplished while achieving the sector development targets under the Regional Waste Management Program for the DRC, focusing on short-, medium- and long-term objectives. The objectives focus on issues related to population coverage with waste collection services, packaging and organic waste resource reclamation and issues related to specific waste stream management, while at the same time strengthening the institutional capacities at the level of the waste management region/zone and the relevant legal framework.

3.6 Sector development vision

By 2017, the conditions required for access to safe sanitation services will be provided in Dubasari rayon and the whole waste management zone for 100 per cent of the urban population and 75 per cent of the rural population. Also, recovery of packaging waste resources and treatment of specific resources will be ensured, as well as development of regional infrastructure for the collection, transfer and transportation of waste (transfer stations) in the zone, reduction of the existing landfills to 1-3 per rayon and improved locations for the transition period. By 2022, but also later, the rayon's performance must reach about 100 per cent of rural and urban population coverage with improved services of organic and packaging waste recovery, specific waste treatment and a single sanitary landfill must be operated jointly with the cluster of rayons associated in the management zone. All these will result in improved services and living standards and will ensure sanitary and environment conditions for the entire rayon.

4 Hincesti rayon

4.1 Geographical position

Hincesti rayon is located in the central part of Moldova, in Codri area. It borders Ialoveni, Cimislia, Leova and Nisporeni rayons, but also Romania. The rayon has groundwater sources. The surface of the rayon is about 1,483 km².⁴

Figure 4-1: Geographical position of Hincesti rayon



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Table 4-1: Data about Hincesti rayon

Data about the rayon			
	Urban	Rural	Total
General information			
Population [pers] (NBS data)	16,800	105,200	122,000
Number of villages/localities	1	38/62	39/63
Existing sanitation services			
Hincesti	1	-	1
Existing landfills			
Number of existing landfills	1	75	76
Landfills' extension capacity	Hincesti	Carpineni Sarata Galbenei Bujor Lapusna Obileni	6
Generated/disposed waste			
Generated waste (t/year)	4,534	20,063	24,597
Technical endowment of the waste management sector			
Garbage trucks	5	-	5
Tractor trailer	2	-	2
Bulldozer	1	-	1
Financial aspects of sanitation services			
Average tariff for services (lei/month)	Data are not available	Data are not available	Data are not available

4.2 Existing waste management system

The waste management infrastructure includes a large number of waste dumps, located in almost each locality. These dumps do not meet the location and organization requirements. The existing dumpsites are not fenced, the compaction technology is not complied with, and no security service is available. There is a sanitation service in the rayon, but its technical endowment is insufficient for expanding the waste collection and transportation services to other localities. The waste management system is organized at the urban level only in Hincesti rayon. Waste is collected using old equipment, which is insufficient. Waste storage in rural areas (and in urban as well) is conducted chaotically, without observing the technical regulations for storage. Because of lack of infrastructure for hospital waste treatment and disposal, it often gets to the existing dumpsites. Waste is collected in a mixed manner and is transported to the existing landfills. Separate collection of PET is conducted partially by companies. The population of villages that are not covered by services transports the waste by its own vehicles, which do not meet any environment protection standards. Landfills with potential expansion capacities to other localities exist in

Hincesti town and in Capriana, Sarata Galbena, Obileni, Dancu, Bobeica, Bujor and Lapusna villages. Urgent actions for reanimation of environment as result of the impact caused by waste management are required in landfills in most villages in the rayon.

In 2006-2011, financial support was requested from NEF and NFRD sources based on projects designed to strengthen the technical capacity of the sanitation service and ensure environment protection.

Many of these projects are already being implemented. In Hincesti town a modern solid household waste landfill has been built recently. These works were conducted under the "A Clean Environment for a Sustainable Regional Development Project" financed by the NFRD and the Hincesti LPA I.

4.3 Service providers

Currently, sanitation services exist in Hincesti LPA I. Capacities for expansion of the existing services may emerge if this service is equipped with the necessary infrastructure and machineries. The responsibility for the maintenance of existing services lies with the local public authorities in these localities.

4.4 Key challenges

The development of waste management infrastructure in Hincesti rayon is planned to take place within the waste management zone, comprising Hincesti, Ialoveni, Anenii Noi, Straseni, Dubasari and Criuleni rayons, according to the preferred scenario within the regional planning and the Waste Development Strategy, approved by GD no. 248 of 10.03.2013. The key challenges are:

- Association of local public administration authorities for waste management in the entire waste management zone, according to the new approaches to sector development at the regional level;
- Construction of a single landfill and creation of infrastructure related to the waste management zone.

4.5 Development prospects

The development prospects are associated with improved quality of sanitation services in Hincesti rayon. These will be accomplished while achieving the sector development

targets under the Regional Waste Management Program for the DRC, focusing on short-, medium- and long-term objectives.

The objectives focus on issues related to population coverage with waste collection services, packaging and organic waste resource recovery and issues related to specific waste stream management, while at the same time strengthening the institutional capacities at the level of the waste management region/zone and the relevant legal framework.

4.6 Sector development vision

By 2017, the conditions required for access to safe sanitation services will be provided in Hincesti rayon for 100 per cent of the urban population and 75 per cent of the rural population. Also, recovery of packaging waste resources and treatment of specific resources will be ensured, as well as development of regional infrastructure for the collection, transfer and transportation of waste (transfer stations) in the zone, reduction of the existing landfills to 1-3 per rayon and improved locations for the transition period.

By 2022, but also later, the rayon's performance must reach about 100 per cent or rural and urban population coverage with improved services of organic and packaging waste recovery, specific waste treatment and a single sanitary landfill must be operated jointly with the cluster of rayons associated in the management zone. All these will result in improved services and living standards and will ensure sanitary and environment conditions for the entire rayon.

5 Ialoveni rayon

5.1 Geographical position of Ialoveni rayon

Ialoveni rayon is located in the central part of the Republic of Moldova, 14 km from Chisinau and neighbours - Criuleni rayon to the North, Anenii Noi and Causeni rayons to the West, Nisporeni and Strasen rayons to the East and Hincesti and Cimislia rayons to the south. The rayon has groundwater sources. Ialoveni rayon lies on a surface of 783 km².

Figure 5-1: Geographical position of Ialoveni rayon



Table 5-1: Data about Ialoveni rayon

Data about the rayon			
	Urban	Rural	Total
General information			
Population [pers] (NBS data)	N/A	83,600	83,600
Number of villages/localities	1	24/33	25/34
Existing sanitation services			
Ialoveni town	1	-	1
Existing landfills			
Number of existing landfills	1	32	33
Landfills' extension capacity	N/a	N/a	N/a
Generated/disposed waste			
Generated waste (t/year)	4,212	16,097	20,308
Technical endowment of the waste management sector			
Garbage trucks	3	-	3
Bulldozer	2	-	2
Tractor trailer	1	-	1
Financial aspects of sanitation services			
Number of services	Data are not available	Data are not available	Data are not available
Average tariff for services (lei/month)	Data are not available	Data are not available	Data are not available

5.2 Existing waste management system

The waste management infrastructure in the rayon is poorly developed. The town has insufficient technical equipment for expanding the waste collection and transportation services to other localities. The technical equipment of the sanitation service is also insufficient. Waste is collected in a mixed manner, in bins, and is transported to the existing landfills. Separate collection of PET is conducted partially by companies. The population of villages that are not covered by services transports the waste by its own vehicles to dump sites that do not meet any environment protection standard and such dumpsites are located chaotically in nearly each locality. The laloveni rayon is one of the rayons that have not benefitted of projects financed from other sources for the development of service capacity, except for Milestii Mici village, which benefitted of NEF sources for building bin platforms, procuring bind and a garbage truck.

The landfills existing in the rayon's localities are not authorized and are not arranged according to requirements. Most landfills are located with violations of regulations in force. The non-complying landfills must be closed. The compaction technology is not observed in the existing landfills. Some landfills are located in quarries, in former warehouses for chemicals and on the land of former wastewater treatment plants (Carbuna village). Landfills requiring urgent remedies are those located in Cigirleni and Alexandrovca villages and in laloveni town.

5.3 Service providers

Currently, sanitation services exist in laloveni town. The responsibility for operation and maintenance of existing services lies with the local public authorities in these localities. The sanitation service in laloveni town might be extended in order to provide services to other localities of the rayon as well, if the existing potential is strengthened.

5.4 Key challenges

The development of waste management infrastructure in the rayon is planned to take place within the waste management zone, comprising Hincesti, Criuleni, Anenii Noi, Strasenii and Dubasari rayons, according to the preferred scenario within the regional planning and the Waste Development Strategy, approved by GD no. 248 of 10.03.2013. The key challenges are:

- Association of local public administration authorities for waste management in the entire waste management zone, according to the new approaches to sector development at the regional level;
- Construction of a single landfill and creation of infrastructure related to the waste management zone.

5.5 Development prospects

The development prospects are associated with improved quality of sanitation services in laloveni rayon. These will be accomplished while achieving the sector development targets under the Regional Waste Management Program for the DRC, focusing on short-, medium- and long-term objectives.

The objectives focus on issues related to population coverage with waste collection services, packaging and organic waste resource reclamation and issues related to specific waste stream management, while at the same time strengthening the institutional capacities at the level of the waste management region/zone and the relevant legal framework.

5.6 Sector development vision

By 2017, the conditions required for access to safe sanitation services will be provided in Ialoveni rayon for 100 per cent of the urban population and 75 per cent of the rural population. Also, recovery of packaging waste resources and treatment of specific resources will be ensured, as well as development of regional infrastructure for the collection, transfer and transportation of waste (transfer stations) in the micro-zone, reduction of the existing landfills to 1-3 per rayon and improved locations for the transition period. By 2022, but also later, the rayon's performance must reach about 100 per cent of rural and urban population coverage with improved services of organic and packaging waste recovery, specific waste treatment and a single sanitary landfill must be operated jointly with the cluster of rayons associated in the management zone. All these will result in improved services and living standards for the population.

6 Nisporeni rayon

6.1 Geographical position

Nisporeni rayon is located in the centre-western part of Moldova, at 70 km from Chisinau. It neighbours Calarasi rayon to the north, Hincesti rayon to the South and Ungheni and Romania to the West and Straseneni to the East. Nisporeni rayon is crossed by the Prut River and 3 smaller rivers: Nirnova, Lapusna and Cogilnic. The surface of the rayon is about 629 km².

Figure 6-1: Geographical position of Nisporeni rayon



Table 6-1: Data about Nisporeni rayon

Data about the rayon			
	Urban	Rural	Total
General information			
Population [pers] (NBS data)	14,600	52,200	66,800
Number of villages/localities	1	22/38	23/39
Existing sanitation services			
Nisporeni	1	-	1
Cristesti	-	1	1
Existing landfills			
Number of existing landfills	1	24	25
Landfills' extension capacity	-	Cristesti Siscani	2
Generated/disposed waste			
Generated waste (t/year)	3,890	9,984	13,874
Technical endowment of the waste management sector			
Garbage trucks	3	1	4
Tractor trailer	2	-	2
Financial aspects of sanitation services			
Number of services	1	1	2
Average tariff for services (lei/month)	Data are not available	Data are not available	Data are not available

6.2 Existing waste management system

The waste management infrastructure includes a large number of waste dumps, located in almost each locality. These dumpsites do not meet the location and organization requirements, particularly as regards the location, the geographical structure of the substrate, presence of hydro-technical facilities etc., except landfills in Cristesti village and Milesti village. The location of the landfills varies: silage pits of the former animal farms (Soltanesti village, Vinatori village); in clay quarries (Boltun village, Bursuc village); on slopes affected by landslides (Ciutesti village, Cioresti village), at the road margins (Seliste village, Ciutesti village), on ramps (Siscani village) etc. These landfills are not fenced, the compaction technology is not complied with, and no security service is available. In 2012 a deplorable situation was recorded as regards the storage of waste at the polygon in Nisporeni town. There are two sanitation services registered in the rayon, which require technical equipment and facilities in order to be able to serve all locations in the rayon. Waste is collected in a mixed manner and is transported to the existing landfills, ignoring the environmental standards. With NEF support, landfills in Cristesti, Nisporeni, Iurceni were organized, as well as 30 polygons with 90 bins in Milesti village, 20 polygons with 60 bins in Cristesti, garbage trucks were purchased in Nisporeni town and in Cristesti village. 20 polygons and 60 bins were arranged in Bursuc, Boltun and Iurceni villages, which will improve the waste management infrastructure and will help in the separate collection of waste. An essential contribution for waste management infrastructure development is provided by the NFRD. The sources allocated from this fund have been used for organizing waste polygons, the first stage of landfill construction was completed, 2 garbage trucks and bins for collection of plastic materials in three neighboring rayons - Nisporeni, Calarasi and Straseneni -were purchased.

Landfills with potential for expansion of services to other localities can be found in Cristesti and Siscani villages. Landfills requiring remediation or closure are located in Nisporeni town (adjacent to residential houses), s. Valea Trestieni village (river protection valley), Cioresti village (slope facing the village), Calimanesti village (Nirnova river valley).

6.3 Service providers

Currently, sanitation services exist in Nisporeni town and in Cristesti village. There are capacities for expansion of this service to other localities as well. Responsibility for maintenance of these services lies with the local public authorities.

6.4 Key challenges

The development of waste management infrastructure in the rayon is planned to take place within the waste management zone, comprising Calarasi and Ungheni rayons, according to the preferred scenario within the regional planning and the Waste Development Strategy, approved by GD no. 248 of 10.03.2013. The key challenges are:

- Association of local public administration authorities for waste management in the entire waste management zone, according to the new approaches to sector development at the regional level;
- Construction of a single landfill and creation of infrastructure related to the waste management zone.

6.5 Development prospects

The development prospects are associated with improved quality of sanitation services in Nisporeni rayon. These will be accomplished while achieving the sector development

targets under the Regional Waste Management Program for the DRC, focusing on short-, medium- and long-term objectives. The objectives focus on issues related to population coverage with waste collection services, packaging and organic waste resource reclamation and issues related to specific waste stream management, while at the same time strengthening the institutional capacities at the level of the waste management region/zone and the relevant legal framework.

6.6 Sector development vision

By 2017, the conditions required for access to safe sanitation services will be provided in Nisporeni rayon for 100 per cent of the urban population and 75 per cent of the rural population. Also, recovery of packaging waste resources and treatment of specific resources will be ensured, as well as development of regional infrastructure for the collection, transfer and transportation of waste (transfer stations) in the micro-zone, reduction of the existing landfills to 1-3 per rayon and improved locations for the transition period. By 2022, but also later, the rayon's performance must reach about 100 per cent or rural and urban population coverage with improved services of organic and packaging waste recovery, specific waste treatment and a single sanitary landfill must be operated jointly with the cluster of rayons associated in the management zone. All these will result in improved services and living standards and will ensure sanitary and environment conditions for the entire rayon.

7 Rezina rayon

7.1 Geographical position

Rezina rayon is located on the right bank of the Dniester River at 98 km distance from Chisinau. The rayon neighbours Tareuca village to the west. The old village Rezina is located at Rezina riverhead, on the bank of the Dniester River. The surface of the rayon is about 622 km².

Figure 7-1: Geographical position of Rezina rayon 71



Table 7-1: Data about Rezina rayon

Data about the rayon			
	Urban	Rural	Total
General information			
Population [pers] (NBS data)	13,500	39,100	52,600
Number of villages/localities	1	24/40	25/41
Existing sanitation services			
Rezina	1	-	1
Existing landfills			
Number of existing landfills	1	65	66
Landfills' extension capacity	-	Trifesti Saharna	2
Generated/disposed waste			
Generated waste (t/year)	3,595	7,454	11,049
Technical endowment of the waste management sector			
Garbage trucks	2	-	2
Tractor trailer	2	-	2
Bulldozer	1	-	1
Financial aspects of sanitation services			
Number of services	1	-	1
Average tariff for services (lei/month)	Data are not available	Data are not available	Data are not available

7.2 Existing waste management system

The waste management infrastructure includes a large number of waste dumpsites, located in each village, and some villages even have several waste disposal sites. These dumps do not meet the location and organization requirements. Some of them are located in the former water storage basins (Sircova village, Pripiceni village, Razesti village, Peciste village, Ignatei village, Saharna village, Tareuca village), in clay quarries (Ciniseuti village), sand quarries Soloncenii village) and on ramps (Busauca village). The existing dumpsites are not fenced, the compaction technology is not complied with, and no security service is available. At the same time, there are some well-organized landfills, such as those in Trifesti or Rezina. There is a sanitation service registered in the rayon, but its technical endowment is insufficient for ensuring the waste collection and transportation services to landfills in other localities. Separate selection of waste is conducted in Lipcenii, Tareuca, Sircova and Piscarestii villages. Waste is collected in a mixed manner and is transported to the existing landfills. Separate collection of PET is conducted partially by companies. The population of villages that are not covered by services transports the waste by its own vehicles.

Landfills with potential for expansion of services to other localities can be found in Trifesti and Saharna villages. Some localities in Rezina rayon support the initiative of inter-municipal cooperation development with other localities in other rayons (Soldanesti, Floresti), for the purpose of improving the waste management at the inter-municipal level.

7.3 Service providers

Currently, sanitation services exist in Rezina. The capacities of expanding this service are minimal, because of the shortage of technical equipment. The responsibility for the maintenance of existing services lies with the local public authorities in these localities.

7.4 Key challenges

The development of waste management infrastructure in Rezina rayon is planned to take place within the waste management zone, comprising Soldanesti, Orhei and Telenesti rayons, according to the preferred scenario within the regional planning and the Waste Development Strategy, approved by GD no. 248 of 10.03.2013. The key challenges are:

- Association of local public administration authorities for waste management in the entire waste management zone, according to the new approaches to sector development at the regional level;
- Construction of a single landfill and creation of infrastructure related to the waste management zone.

7.5 Development prospects

The development prospects are associated with improved quality of sanitation services in Rezina rayon or development of inter-municipal cooperation with other rayons in the waste management zone. The inter-municipal cooperation will allow achieving the sector development targets under the Regional Waste Management Program for the DRC, focusing on short-, medium- and long-term objectives.

The objectives focus on issues related to population coverage with waste collection services, packaging and organic waste resource reclamation and issues related to specific waste stream management, while at the same time strengthening the institu-

tional capacities at the level of the waste management region/zone and the relevant legal framework.

7.6 Sector development vision

By 2017, the conditions required for access to safe sanitation services will be provided in Rezina rayon for 100 per cent of the urban population and 75 per cent of the rural population. Also, recovery of packaging waste resources and treatment of specific resources will be ensured, as well as development of regional infrastructure for the collection, transfer and transportation of waste (transfer stations) in the zone, reduction of the existing landfills to 1-3 per rayon and improved locations for the transition period.

By 2022, but also later, the rayon's performance must reach about 100 per cent of rural and urban population coverage with improved services of organic and packaging waste recovery, specific waste treatment and a single sanitary landfill must be operated jointly with the cluster of rayons associated in the management zone. All these will result in improved services and living standards and will ensure sanitary and environment conditions for the entire rayon.

8 Soldanesti rayon

8.1 Geographical position

Soldanesti rayon is located in the north-east of Moldova. To the north and North-West the rayon has administrative borders with Floresti rayon, to south-west - with Telenesti rayon, South and south-East - with Rezina rayon, to the East - with ATU on the left bank of the Dniester. The territory of the rayon is crossed by Ciorna River - a tributary of the Dniester. The surface of the rayon is about 598 km².

Figure 8-1: Geographical position of Soldanesti rayon



Table 8-1: Data about Soldanesti rayon

Data about the rayon			
	Urban	Rural	Total
General information			
Population [pers] (NBS data)	7,600	35,700	43,300
Number of villages/localities	1	22/32	23/33
Existing sanitation services			
Soldanesti	1	-	1
Cotuijenii Mari	-	1	1
Existing landfills			
Number of existing landfills	1	78	79
Service expansion capacity	-	Dobrusa Cotuijenii Mari Cusmirca Alcedar	4
Generated/disposed waste			
Generated waste (t/year)	2,012	6,803	8,815
Technical endowment of the waste management sector			
Tractor trailer	2	-	1
Bulldozer	1	-	1
Garbage trucks	3	2	5
Financial aspects of sanitation services			
Number of services	1	1	2
Average tariff for services (lei/month)	Soldanesti - 5,1	Cotuijenii Mari -	-

	lei/month individuals and 150 lei/month legal entities	10 lei/month individuals and 100 lei/month legal entities	
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8.2 Existing waste management system

The waste management infrastructure in the rayon is poorly developed. The rayon has the technical equipment for collection and transportation in Soldanesti town and in Cotiujenii Mari vi-ge, but there are no landfills organized according to relevant requirements. Most landfills are overloaded, located on slopes, in areas of water basins protection and do not meet the environmental protection requirements. Some landfills are located in the former silage pits or manure pits Fuzauca village, Raspopeni village and Dobrusa), in clay quarries (Salcia, Climautii de Jos, Alcedar), on land affected by landslides (Soldanesti), on ramps Chipesca) and on former pig farms (Gauzeni, Rogojeni, Cotiujenii Mari and Vadul lui Rascov). The supply of technical equipment for the sanitation services in 2010-2013 was conducted mainly with the support of the German Development Cooperation through GIZ, NFRD and the NEF. At the same time, an investment of 4,043,609 lei under the project financed from these funds is expected to be used for building a SWM landfill in Soldanesti, to be used by localities of the rayon and some localities of Rezina and Floresti rayons. As result, construction of 54 platforms, 10 eco homes, 400 dump barrows, 100 installed boxes, as well as procurement of equipment for serving the waste management system for three rayons is expected.

The rayon benefitted of other projects financed from the NEF, including for construction of landfills in 4 LPA I and 8 villages (Cotiujenii Mari LPA I).

Construction of a transfer station is currently ongoing in Cotiujenii Mari village. In Soldanesti town, the separate waste collection system is partially implemented. Separate collection is conducted through ECO homes, installed under a project supported by UNDP.

Due to them, paper, cardboard, glass and PET are separated. To improve inter-municipal cooperation in waste management, association of localities in three rayons was initiated with GIZ support, for the joint management of this system.

Landfills' extension capacity exists in Dobrusa, Cusmirca and Alcedar villages. Landfills requiring urgent improvement or liquidation are located in Poiana, Glinjeni, Sipca, Sestaci, Soldanesti, Parcani, Mihuleni, Salcia, Samascani villages.

8.3 Service providers

Currently, sanitation services exist in Soldanesti and Cotiujenii Mari villages. The responsibility for operation and maintenance of existing services lies with the local public authorities in these localities. The sanitation service Soldanesti can expand its services to other localities of the rayon, including in other localities in Rezina and Floresti rayons, upon their request.

8.4 Key challenges

The development of waste management infrastructure in the rayon is planned to take place within the waste management zone, comprising Telenesti and Orhei rayons, according to the preferred scenario within the regional planning and the Waste Development Strategy, approved by GD no. 248 of 10.03.2013. The key challenges are:

- Association of local public administration authorities for waste management in the entire waste management zone, according to the new approaches to sector development at the regional level;
- Construction and management of a single landfill and creation of infrastructure related to the waste management zone.

8.5 Development prospects

The development prospects are associated with improvement of the quality of sanitation services in the entire Soldanesti rayon and in other rayons, within the waste management zone, in order to achieve the sector development targets under the Regional Development Program for Waste Management for the DRC, focusing on short-, medium- and long-term objectives.

The objectives focus on issues related to population coverage with waste collection services, packaging and organic waste resource reclamation and issues related to specific waste stream management, while at the same time strengthening the institutional capacities at the level of the waste management region/zone and the relevant legal framework.

8.6 Sector development vision

By 2017, the conditions required for access to safe sanitation services will be provided in Soldanesti rayon for 100 per cent of the urban population and 75 per cent of the rural population. Also, recovery of packaging waste resources and treatment of specific resources will be ensured, as well as development of regional infrastructure for the collection, transfer and transportation of waste (transfer stations) in the micro-zone, reduction of the existing landfills to 1-3 per rayon and improved locations for the transition period.

By 2022, but also later, the rayon's performance must reach about 100 per cent or rural and urban population coverage with improved services of organic and packaging waste recovery, specific waste treatment and a single sanitary landfill must be operated jointly with the cluster of rayons associated in the management zone. All these will result in improved services and living standards and will ensure sanitary and environment conditions for the entire rayon.

9 Strasenii rayon

9.1 Geographical position

Strasenii rayon is located in the central part of Moldova, at 23 km from Chisinau - the capital of the Republic of Moldova. It borders Orhei and Calarasi rayons to the north, Chisinau municipality to the East, Ialoveni and Hincesti rayons and Nisporeni rayon to the West. The total surface of the rayon is 760 km².⁹¹

Figure 9-1: Geographical position of Strasenii rayon



Table 9-1: Data about Strasenii rayon

Data about the rayon			
	Urban	Rural	Total
General information			
Population [pers] (NBS data)	20,300	71,300	91,300
Number of villages/localities	2	25/38	27/39
Existing sanitation services			
Strasenii	1	-	1
Sireti - Cojuszna	-	1	1
Romanesti	-	1	1
Existing landfills			
Number of existing landfills	1	26	27
Landfills' extension capacity	-	Lozova Romanesti Cojuszna Chirianca	4
Generated/disposed waste			
Generated waste (t/year)	5,822	13,375	19,197
Technical endowment of the waste management sector			
Garbage trucks	2	1	3
Tractor trailers	2	3	5
Bulldozer	1	-	1
Financial aspects of sanitation services			
Number of services	1	2	3
Average tariff for services (lei/month)	Data are not available	Data are not available	Data are not available

9.2 Existing waste management system

The waste management infrastructure in Straseni rayon includes a large number of landfills, located and landscaped with violation of the existing relevant requirements. The landfills are located in various places: silage pits or manure pits (Scoreni, Recea, Chirianca, Greblesti villages), quarries (Cojusna, Dolna, Bucovat, Micauti villages); on slopes affected by landslides Vorniceni, Lozova villages), at the road margins (Tataresti village) etc. In almost all landfills the waste is disposed chaotically, without any compaction, the waste is only aggregated periodically. All landfills in the rayon have access road, in most cases it is a country-road. Only the roads in Straseni, Scoreni and Romanesti are covered with gravel. The waste in the rayon is not aggregated and is unguarded. Urgent remediation actions are required for landfills in Micauti and Gornie villages. There are three sanitation services registered in the rayon, the technical equipment of which may ensure collection and storage of waste for several localities. With the support of NEF and NFRD, the rayon benefitted of financial support to improve the waste collection and disposal infrastructure (in Romanesti, Balabanu, Tataresti, Zubresti and Straseni).

Supply of technical equipment is required for sanitation services in Romanesti, Cojusna and Galesti.

9.3 Service providers

Currently, sanitation services exist in Straseni town, Sireti and Romanesti villages. Capacity for expansion of the sanitation service over other localities exists in Straseni town. The responsibility for the maintenance of existing services lies with the local public authorities in these localities.

9.4 Key challenges

The development of waste management infrastructure in the rayon is planned to take place within the waste management zone, comprising Ialoveni, Criuleni, Hincesti, Dubasari and Anenii Noi rayons, according to the preferred scenario within the regional planning and the Waste Development Strategy, approved by GD no. 248 of 10.03.2013. The key challenges are:

- Association of local public administration authorities for waste management in the entire waste management zone, according to the new approaches to sector development at the regional level;
- Construction of a single landfill and creation of infrastructure related to the waste management zone.

9.5 Development prospects

The development prospects are associated with improved quality of sanitation services in Straseni rayon. These will be accomplished while achieving the sector development targets under the Regional Waste Management Program for the DRC, focusing on short-, medium- and long-term objectives. The objectives focus on issues related to population coverage with waste collection services, packaging and organic waste resource reclamation and issues related to specific waste stream management, while at the same time strengthening the institutional capacities at the level of the waste management region/zone and the relevant legal framework.

9.6 Sector development vision

By 2017, the conditions required for access to safe sanitation services will be provided in Straseni rayon for 100 per cent of the urban population and 75 per cent of the rural

population. Also, recovery of packaging waste resources and treatment of specific resources will be ensured, as well as development of regional infrastructure for the collection, transfer and transportation of waste (transfer stations) in the micro-zone, reduction of the existing landfills to 1-3 per rayon and improved locations for the transition period.

By 2022, but also later, the rayon's performance must reach about 100 per cent or rural and urban population coverage with improved services of organic and packaging waste recovery, specific waste treatment and a single sanitary landfill must be operated jointly with the cluster of rayons associated in the management zone. All these will result in improved services and living standards and will ensure sanitary and environment conditions for the entire rayon.

10 Telenesti rayon

10.1 Geographical position

Telenesti rayon is located in the centre of Moldova, at half the Chisinau - Balti road, i.e. 90 km from Chisinau and 50 km from Balti. Telenesti borders Orhei, Rezina, Soldanesti, Floresti, Calarasi, Ungheni and Singerei rayons. Some territory of the rayon is subject to exogenous processes - erosion, landslides. The total surface of the rayon is 849 km².

Figure 10-1: Geographical position of Telenesti rayon



Table 10-1: Data about Telenesti rayon

Data about the rayon			
	Urban	Rural	Total
General information			
Population [pers] (NBS data)	8,200	66,000	74,200
Number of villages/localities	1	30/53	31/54
Existing sanitation services			
Telenesti	1	-	1
Existing landfills			
Number of existing landfills	1	34	35
Landfills' extension capacity	Telenesti	-	1
Generated/disposed waste			
Generated waste (t/year)	2,173	12,609	14,782
Disposed waste (t/year)	-	-	-
Technical endowment of the waste management sector			
Garbage trucks	2	-	2
Tractor trailers	1	-	1
Bulldozer	1	-	1
Financial aspects of sanitation services			
Number of services	1	-	1
Average tariff for services (lei/month)	Data are not available	Data are not available	Data are not available

10.2 Existing waste management system

The waste management infrastructure in the rayon is extremely poorly developed. The rayon is insufficiently equipped for collection and transportation of waste in Telenesti

town. Separate collection of PET is conducted partially by companies. Waste is collected in a mixed manner and is transported to the existing landfills. The population of villages that are not covered by services transports the waste by its own vehicles to landfills that do not meet any environment protection standards.

The landfills existing in the rayon's localities are not arranged according to environmental protection requirements. Most fractions in the morphological structure of waste are represented by manure (40-60%). The compaction technology is not observed in the existing landfills. Some landfills are located:

- In silage pits or liquid manure pits (Telenesti, Cazanesti,
- Scorteni, Pistruieni, Nucareni),
- In quarries Brinzenii Vechi, Ghiliceni, Negureni, Saratenii Vechi), in the river valley (Verejeni, Cisla, Hiriseni).

In most cases, waste is located beyond the established area of the landfill. There are no properly landscaped landfills in the rayon. Construction works of landfill in Telenesti town that will be landscaped and used according to environmental protection requirements have been performed. The rayon benefitted of financial support from the NEF and NFRD for the waste sector. Due to this support, the technical base of the sanitation services was improved, platform storage places were landscaped, and bins for the separate collection of waste have been procured. To improve the state of the environment in the area of overloaded landfills, these must be liquidated (Verejeni, Tirsitei, Nucareni, Codrul Nou, Ghiliceni, Cucioaia villages), and after the landfill in Telenesti town is build, it will be possible to store the waste from the rayon in this landfill.

10.3 Service providers

Currently, sanitation services exist in Telenesti town. The responsibility for operation and maintenance of existing services lies with the local public authorities in these localities. The sanitation service in Telenesti might be extended in order to provide services to other localities of the rayon as well, if the existing potential is strengthened.

10.4 Key challenges

The development of waste management infrastructure in the rayon is planned to take place within the waste management zone, comprising Orhei, Soldanesti and Rezina rayons, according to the preferred scenario within the regional planning and the Waste Development Strategy, approved by GD no. 248 of 10.03.2013. The key challenges are:

- Association of local public administration authorities for waste management in the entire waste management zone, according to the new approaches to sector development at the regional level;
- Construction of a single landfill and creation of infrastructure related to the waste management zone.

10.5 Development prospects

The development prospects are associated with improved quality of sanitation services in Telenesti rayon. These will be accomplished while achieving the sector development targets under the Regional Waste Management Program for the DRC, focusing on short-, medium- and long-term objectives.

The objectives focus on issues related to population coverage with waste collection services, packaging and organic waste resource reclamation and issues related to specific waste stream management, while at the same time strengthening the institutional capacities at the level of the waste management region/zone and the relevant legal framework.

10.6 Sector development vision

By 2017, the conditions required for access to safe sanitation services will be provided in Telenesti rayon for 100 per cent of the urban population and 75 per cent of the rural population. Also, recovery of packaging waste resources and treatment of specific resources will be ensured, as well as development of regional infrastructure for the collection, transfer and transportation of waste (transfer stations) in the micro-zone, reduction of the existing landfills to 1-3 per rayon and improved locations for the transition period.

By 2022, but also later, the rayon's performance must reach about 100 per cent of rural and urban population coverage with improved services of organic and packaging waste recovery, specific waste treatment and a single sanitary landfill must be operated jointly with the cluster of rayons associated in the management zone. All these will result in improved services and living standards and will ensure sanitary and environment conditions for the entire rayon.

11 Ungheni rayon

11.1 Geographical position

Ungheni rayon is located in the central-western part of Moldova and borders Nisporeni, Calarasi, Telenesti, Singerei and Falesti rayons. To the west it borders the Prut River, which marks the state border between Romania and Moldova. The surface of the rayon is 108.3 km².¹¹¹

Figure 11-1: Geographical Position of Ungheni rayon



Table 11-1: Data about Ungheni rayon

Data about the rayon			
	Urban	Rural	Total
General information			
Population [pers] (NBS data)	38,100	79,300	117,400
Number of villages/localities	2	31/72	33/74
Existing sanitation services			
Ungheni	1	-	1
Ave-Ungheni	1	-	1
	-	1	1
Existing landfills			
Number of existing landfills	1	38	39
Landfills' extension capacity	Ungheni	-	1
Generated/disposed waste			
Generated waste (t/year)	10,946	14,640	25,586
Disposed waste (t/year)	15,000	-	15,000
Technical endowment of the waste management sector			
Garbage trucks	13	1	14
Tractor trailers	5	-	5
Bulldozers	1	-	1
Lifts	3	-	3
Financial aspects of sanitation services			
Number of services	2	1	3
Average tariff for services (lei/month)	36 lei/month legal entities and 32 lei/month in-	Data are not available	Data are not available

	dividuals		
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11.2 Existing waste management system

There is a relatively well developed, but non-uniform waste management system in Ungheni rayon. The situation is better in Ungheni town and in neighboring villages (Zagarancea, Semeni, Petresti, Sculeni, Valea Mare, Pirlita), that benefit of sanitation services provided by IM "AVE-Ungheni" SRL, which holds license for the collection, separation and disposal of household waste. IM „Ave Ungheni” has established a system for separate collection of paper and plastics in Ungheni town and has conducted collection of recyclable fraction from several localities. All landfills in the rayon have access roads, in most cases it is a country-road and only in some cases the road is paved (Sculeni) or covered with gravel (Ungheni, Cornesti, Magurele). Most landfills are not guarded or fenced, except the landfill in Ungheni town. Most landfills are located with violations of regulations in force. The landfills are located in various places: in silage pits or liquid manure pits Valea Mare, Tescureni, Bumbata, Busila); clay quarries (Condratesti, Cioropcani); land affected by landslides (Cornesti, Napadeni, Agronomovca), hill ridges (Morenii Noi) or river valley Buciumeni village). There are three sanitation services in the rayon. There is a well-developed service in Ungheni town, the technical equipment of which may ensure collection and disposal of waste from several localities. Urgent remedies are needed for landfills in Zagarancea, Cornesti, Buciumeni, Petresti, Busila, Poiana, Frasinesti). Capacity expansion potential for serving other localities exists in landfill in Ungheni town. With the support of NEF the rayon benefitted of financial support to improve the waste collection and disposal capacity.

11.3 Service providers

Currently, sanitation services exist in Ungheni town and Cornesti village. In Ungheni town there are two sanitation service, a municipal and a private one (IM „Ave-Ungheni”). These services are well equipped and may expand their services to other localities in the rayon.

11.4 Key challenges

The development of waste management infrastructure in the rayon is planned to take place within the waste management zone, comprising Calarasi and Nisporeni rayons, according to the preferred scenario within the regional planning and the Waste Development Strategy, approved by GD no. 248 of 10.03.2013. The key challenges are:

- Association of local public administration authorities for waste management in the entire waste management zone, according to the new approaches to sector development at the regional level;
- Construction of a single landfill and creation of infrastructure related to the waste management zone.

11.5 Development prospects

The development prospects are associated with improved quality of sanitation services in Ungheni rayon, along with Nisporeni and Calarasi rayons, which are part of the waste management zone. These will be accomplished while achieving the sector development targets under the Regional Waste Management Program for the DRC, focusing on short-, medium- and long-term objectives. The objectives focus on issues related to population coverage with waste collection services, packaging and organic waste resource reclamation and issues related to specific waste stream management, while at the same time strengthening the institutional capacities at the level of the waste management region/zone and the relevant legal framework.

11.6 Sector development vision

By 2017, the conditions required for access to safe sanitation services will be provided in Ungheni rayon for 100 per cent of the urban population and 75 per cent of the rural population. Also, recovery of packaging waste resources and treatment of specific resources will be ensured, as well as development of regional infrastructure for the collection, transfer and transportation of waste (transfer stations) in the micro-zone, reduction of the existing landfills to 1-3 per rayon and improved locations for the transition period. By 2022, but also later, the rayon's performance must reach about 100 per cent or rural and urban population coverage with improved services of organic and packaging waste recovery, specific waste treatment and a single sanitary landfill must be operated jointly with the cluster of rayons associated in the management zone. All these will result in improved services and living standards and will ensure sanitary and environment conditions for the entire rayon.

12 Anenii Noi rayon

12.1 Geographical position

Anenii Noi rayon is located in the eastern part of the country, in the basin of the Dniester River. To the north, Anenii Noi rayon borders Criuleni rayon, to the West - Chisinau municipality and Ialoveni town, to the South - Causeni town and to the east - the transnistrian region. The surface of the rayon is about 892 km². Most population of the rayon lives in rural areas. Anenii Noi town and a large number of other localities are located in the Valley of Bic River.

Figure 12-1: Geographical position of Anenii Noi rayon



Table 12-1: Data about Anenii Noi rayon

Data about the rayon			
	Urban	Rural	Total
General information			
Population [pers] (NBS data)	8,600	74,500	83,100
Number of villages/localities	1	25/44	26/45
Existing sanitation services			
Anenii Noi, Bulboaca, Tintareni	1	5	6
Florești, Maximovca, Varnita	-	3	3
Existing landfills			
Number of existing landfills	1	38	39
Landfills' extension capacity	Anenii Noi	Merenii Noi	2
Free capacity of landfills	-	Tintareni	1
Generated/disposed waste			
Generated waste (t/year)	2,307	14,276	16,583
Technical endowment of the waste management sector			
Garbage trucks	1	1	2
Tractor trailers	1	4	5
Excavator	-	1	1
Bulldozer	1	-	1
Bulldozer-excavator	-	4	1
Financial aspects of sanitation services			
Number of services	1	5	6
Average tariff for services (lei/month)	Flat - 10/25 Businesses - 98	Households - 15/25 Businesses - 30/65	-

12.2 Existing waste management system

The waste management infrastructure in the rayon is poorly developed. The rayon has the technical equipment for collection and transportation of waste in Anenii Noi town and other three villages in the rayon. Separate collection of PET is conducted partially by companies. Waste is collected in a mixed manner and is transported to the existing landfills. The population of villages that are not covered by services transports the waste by its own vehicles to dump sites that do not meet any environment protection standard and such dumpsites are located chaotically in nearly each locality. In Anenii Noi town a facility for sorting recyclable materials was built with the EU support, but it does not function yet because of lack of recyclable materials. Most landfills are not authorized and arranged according to requirements. The landfill in Tintareni is well organized and has available capacity (disposal of waste has been stopped). If required, expansion capacities may be available in Anenii Noi town and in Merenii Noi village. There are no landfills that would require urgent actions, but overall, all of them must be improved and some of them (Speia, Calfa), which are located close to residential houses, must be liquidated. To improve the state of waste management in some localities in the rayon (Geamana, Tintareni villages, Anenii Noi town), in 2005-2009 financial support was provided from NEF sources. In 2012 a feasibility study was conducted in some localities of the rayon (7) for the concession of the sanitation service.

12.3 Service providers

Currently, sanitation services exist in Anenii Noi town and other three villages in the rayon: Bulboaca, Floreni and Maximovca. The responsibility for operation and maintenance of existing services lies with the local public authorities in these localities. The sanitation service Anenii Noi has potential for expansion of services to other localities of the rayon.

12.4 Key challenges

The development of waste management infrastructure in the rayon is planned to take place within the waste management zone, comprising Ialoveni, Criuleni, Hincesti, Dubasari and Straseni rayons, according to the preferred scenario within the regional planning and the Waste Development Strategy, approved by GD no. 248 of 10.03.2013. The key challenges are:

- Association of local public administration authorities for waste management in the entire waste management zone, according to the new approaches to sector development at the regional level;
- Construction of a single landfill and creation of infrastructure related to the waste management zone.

12.5 Development prospects

The development prospects are associated with improved quality of sanitation services in Anenii Noi rayon. These will be accomplished while achieving the sector development targets under the Regional Waste Management Program for the Central Region, focusing on short-, medium- and long-term objectives.

The objectives focus on issues related to population coverage with waste collection services, packaging and organic waste resource reclamation and issues related to specific waste stream management, while at the same time strengthening the institutional capacities at the level of the waste management region/zone and the relevant legal framework.

12.6 Sector development vision

By 2017, the conditions required for access to safe sanitation services will be provided in Anenii Noi rayon for 100 per cent of the urban population and 75 per cent of the rural population. Also, recovery of packaging waste resources and treatment of specific resources will be ensured, as well as development of regional infrastructure for the collection, transfer and transportation of waste (transfer stations) in the micro-zone, reduction of the existing landfills to 1-3 per rayon and improved locations for the transition period.

By 2022, but also later, the rayon's performance must reach about 100 per cent of rural and urban population coverage with improved services of organic and packaging waste recovery, specific waste treatment and a single sanitary landfill must be operated jointly with the cluster of rayons associated in the management zone.

All these will result in improved services and living standards and will ensure sanitary and environment conditions for the entire rayon.

13 Orhei rayon

13.1 Geographical position

Orhei rayon is located in the centre of Moldova, on a territory of 40 km from East to West and 40 km from North to South. The rayon centre is located at 40 km from Chisinau, to the North-East. The rayon borders Rezina rayon to the North, the Dniester River to the East, Criuleni rayon to the South and Telenesti rayon to the north-east and Calarasi Rayon to the West. The surface of the rayon is 122.8 km².¹³¹

Figure 13-1: Geographical position of Orhei rayon



Table 13-1: Data about Orhei rayon

Data about the rayon			
	Urban	Rural	Total
General information			
Population [pers] (NBS data)	33,500	92,400	125,900
Number of villages/localities	1	37/74	38/75
Existing sanitation services			
IM SCL Orhei	1	-	1
	-	1	1
Existing landfills			
Number of existing landfills	1	44	45
Landfills' extension capacity	Orhei	Jora de Mijloc Pohrebeni Chipercenti Crihana	5
Generated/disposed waste			
Generated waste (t/year)	8,987	17,687	26,674
Technical endowment of the waste management sector			
Garbage trucks	6	-	6
Tractor trailer	6	-	6
Bulldozer-excavator	1	-	1
Financial aspects of sanitation services			
Number of services	1	1	2
Average tariff for services (lei/month)	9 lei/person/ Businesses - data are not available	Data are not available	-

13.2 Existing waste management system

The waste management infrastructure in the rayon is poorly developed. Many of the existing landfills do not meet the requirements, as they are located with violations of regulations in force. The landfills are located in various places - in "water storage basins" (Step-Soci, Biesti), clay quarries (Mârzaci; Trebujeni; Ciocilteni), stone quarries (Viscauti), former treatment plant (Piatra; Ivancea), former warehouses for chemicals (Putintei; Crihana), wine factory (Susleni), demolished tobacco drying plant (Balasesti), former warehouse for cereals (Breanova, Podgoreni). All warehouses have access road – either gravel (Bulaiesti, Viscauti, Piatra, Pohorniceni, Furceni, Trebujeni, Peresecina, Camencea, Ghetlova, Teleseu, Putintei, Morozeni, Seliste, Step-Soci, Zahoreni, Crihana, Clisova, Malaiesti, Braviceni, Mitoc, Orhei), or paved road (Podgoreni, Biesti). About 90% of warehouses require waste compaction activities. Landfills requiring urgent remedies are those located in Ghetlova, Teleseu and Vatici villages. With the support of NEF and NFRD, the rayon benefitted of financial support to improve the waste sanitation capacity and expand the waste collection and disposal infrastructure. Landfills with potential to expand their services to neighbouring localities are those located in Jora de Mijloc (for Lopatna, Jora de Sus, Jora de Jos), Pohrebeni (for Izvoare, Sarcani), Chiperceni (for Vorotet, Andreevca) and the landfill in Crihana (for Sirota, Cucuruzeni). Some localities were subject to feasibility studies for the concession of the sanitation service. These are: Samananca, Biesti, Bulaiesti, Cucuruzeni, Donici/Mitoc/Zorile, Jora de Mijloc/Pohrebeni/Chiperceni, Bolohan).

13.3 Service providers

Currently, sanitation services exist in Orhei town and in Peresecina village. Capacities for expanding services to other localities exist in Sanitation Service in Orhei town. The responsibility for the maintenance of existing services lies with the local public authorities.

13.4 Key challenges

The development of waste management infrastructure in the rayon is planned to take place within the waste management zone, comprising Telenesti, Rezina and Soldanesti rayons, according to the preferred scenario within the regional planning and the Waste Development Strategy, approved by GD no. 248 of 10.03.2013. The key challenges are:

- Association of local public administration authorities for waste management in the entire waste management zone, according to the new approaches to sector development at the regional level;
- Construction of a single landfill and creation of infrastructure related to the waste management zone.

13.5 Development prospects

The development prospects are associated with improved quality of sanitation services in Orhei rayon. These will be accomplished while achieving the sector development targets under the Regional Waste Management Program for the Central Region, focusing on short-, medium- and long-term objectives. The objectives focus on issues related to population coverage with waste collection services, packaging and organic waste resource reclamation and issues related to specific waste stream management, while at the same time strengthening the institutional capacities at the level of the waste management region/zone and the relevant legal framework.

13.6 Sector development vision

By 2017, the conditions required for access to safe sanitation services will be provided in Orhei rayon for 100 per cent of the urban population and 75 per cent of the rural population. Also, recovery of packaging waste resources and treatment of specific resources will be ensured, as well as development of regional infrastructure for the collection, transfer and transportation of waste (transfer stations) in the micro-zone, reduction of the existing landfills to 1-3 per rayon and improved locations for the transition period. By 2022, but also later, the rayon's performance must reach about 100 per cent or rural and urban population coverage with improved services of organic and packaging waste recovery, specific waste treatment and a single sanitary landfill must be operated jointly with the cluster of rayons associated in the management zone. All these will result in improved services and living standards and will ensure sanitary and environment conditions for the entire rayon.

Annex 2: Projections regarding waste amount and structure

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1 Methodology

No direct studies of the amount of waste have been conducted in DRN and DRC. Hence, the current and the historical amount of waste generated in the two regions are not known. Except the audit of the Municipal Enterprise “Regia Apa Canal Soldanesti” conducted at GIZ proposal in 2010, no other audit of the waste sector has been conducted in the country. In the lack of accurate information, the estimates and projections regarding waste generation have been conducted based on information supplied under partial national studies on the waste management, information concerning the management of waste held by Romania’s counties, adjacent to those in the Republic of Moldova, as well as on expert analyses, which, in turn, were based on the observations made under field trips.

Projections of waste generation depend on two important variables: population and economic development of the studied zone. Everyone generates waste. Therefore, the changes in the number of population affect the amount of waste generated by waste and by legal entities. The economic development will result in increased expenditures and consumption, which will increase the amount of waste generated per household, which, in turn, will result in enhanced capacity of waste generated by legal entities.

The development of some estimates on waste for the future requires an analysis of the population and of the economic development. These issues are addressed in the following paragraphs, along with estimation of the amount and the morphological structure of the generated waste.

2 Projections regarding the population and the economy

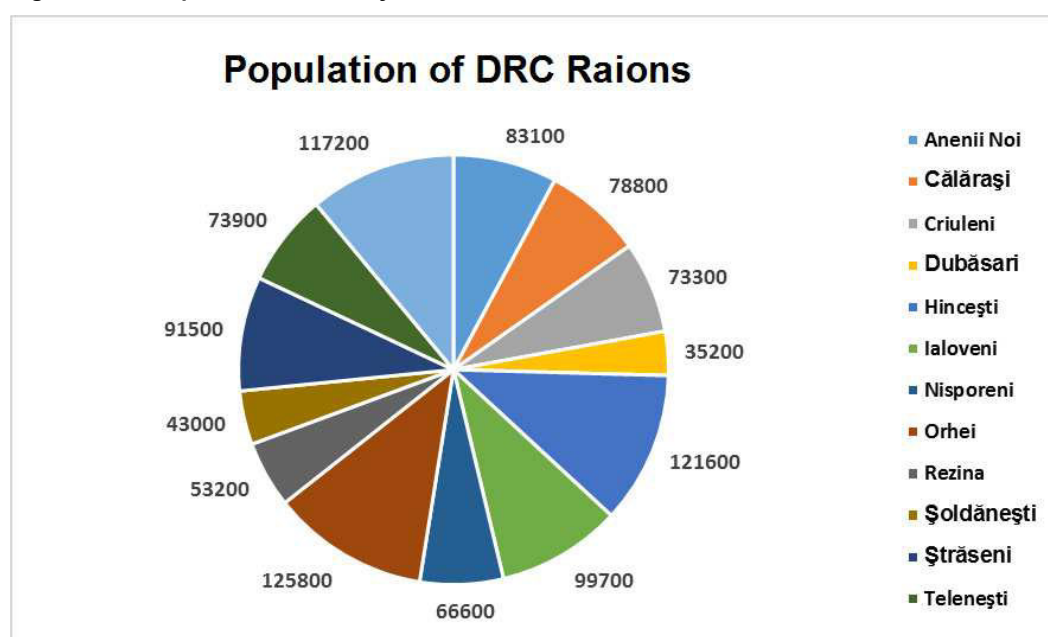
2.1 Projections regarding the population

In order to develop projections concerning the population, information for the following 10 years have been collected from the National Bureau of Statistics and studies and the national annual rate of 0.2% of population decrease was calculated. This rate was used for forecasting the trends in the number of population. The projections of the number of population are performed for a period of 33 years (2012-2045), based on the assumption that the new waste management plan will become operational by 2018-2020 and that the duration of life of sanitary landfills will be 25 years.

The current division of population by rayons, in the DRC, is presented in the charts below.

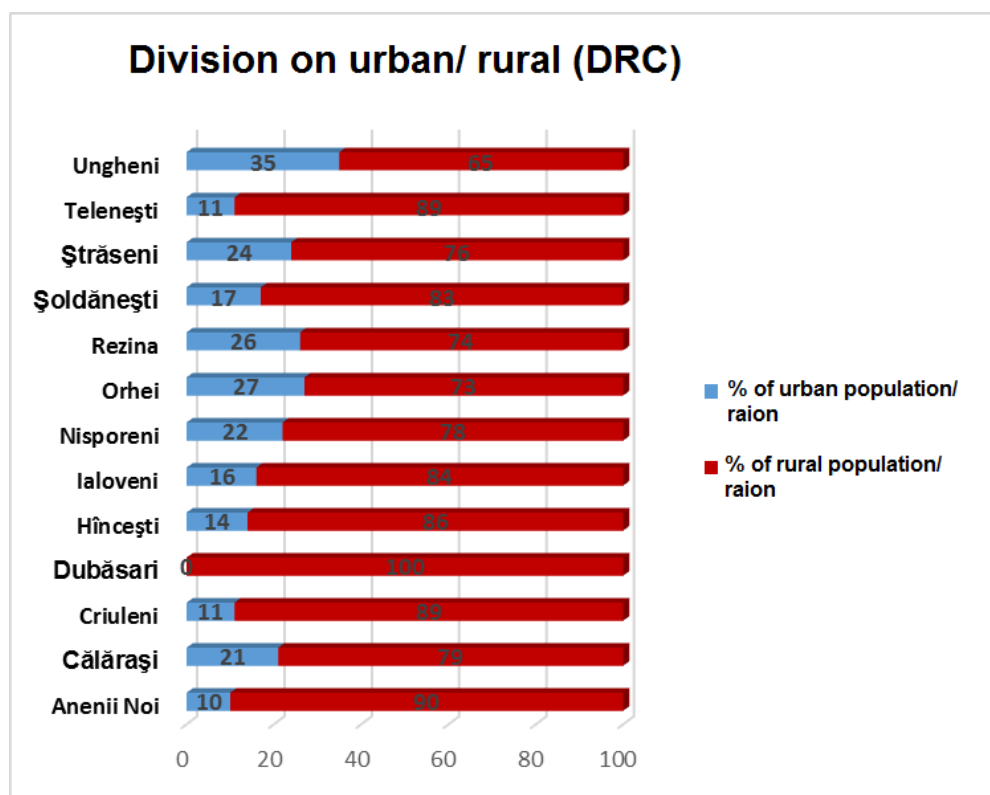
Taking into account the annual rate of population number decrease, according to projections, the total population of the DRC will decrease by 2045 and will record a decline by that period.

Figure 2-1: Population of DRC rayons



Most population currently lives in rural areas, with some exceptions. In Dubasari rayon there are only rural settlements.

Overall, 19.3 per cent of the population live in urban areas, while in DRN the urban population accounts for 35.5%. The rural/urban population ratio in each rayon is presented in the charts below.

Figure 2-2: Distribution of the urban/rural population in DRC

2.2 Economic forecasts

The starting point for the assessment of the level of economic developments is calculation based on the national GDP. According to estimates in the Waste Management Strategy, an annual growth of 5 per cent of the GDP is foreseen. However, GDP is strongly influenced by the population and the economy of Chisinau which is the most developed city and the centre of economic activity. According to estimates, the economic development in other localities of Moldova will not be as significant as in Chisinau. Thus, based on discussions with local authorities, GDP is expected to record an average annual growth rate of 2.5 per cent in the other regions of the country.

3 Projections regarding the amount of waste

Based on the information presented in national strategies and analyses, the waste generation rate for 2012 is 0.735 kg/inhabitant/day for the urban areas and 0.535 kg/inhabitant/day for rural areas. As a result of GDP growth, as well as of changes in the number of population, presented above, it is expected that by 2020 the waste generation rate will reach 0.890 kg/inhabitant/day in urban areas and 0.640 kg/inhabitant/day in rural areas.

Based on these calculations, it is estimated that:

- In 2012, 219,242 tons of waste was generated in DRC; it is estimated that in 2020 this figure will amount to 249,729 tons.

The table below presents the estimated cumulative amounts of generated waste and of waste requiring disposal in sanitary landfills, in the DRC, for a period of 25 years between 2018 and 2043. This period corresponds to the 25-years period of operation of sanitary landfills if they will be commissioned in 2018.

Table 3-1: Generated waste amounts that must be disposed in landfills

Year	2018	2023	2028	2033	2038	2043
DRN						
Total number of generated waste	204,191	1,265,189	2,320,790	3,365,877	4,400,554	5,424,927
Total number of tons of waste disposed in sanitary landfills	73,531	455,608	8,357,405	1,212,087	1,584,685	1,953,572

Although the total number of generated waste is basically the same in DRN and DRC, the distribution of waste generation sources varies considerably. In DRC, about 25 per cent of waste will be generated in urban areas and 75 per cent in rural areas.

4 Morphological structure of waste

The estimations of the structure of waste for DRC and DRN were made based on data provided under “Completion of the Third National Communication under the Framework Conventions of the United Nations on Climate Change” - project financed by the UN. The project was carried out February-December 2012 and includes a comprehensive analysis of waste structure at 4 sanitary landfills locations: Chisinau, Balti, Leova and Causeni. For each of these locations a set of 4 analyses was conducted, for the purpose of examining the structure of waste depending on the season. Thus, these analyses were conducted in March, June, September and November 2012.

This information was later reported to the data on the structure of waste in the neighboring Romanian counties and the analysis of information collected during the activity on site.

The estimated structure of the waste stream for rural and urban areas is presented below.

Table 4-1: Estimated structure of the waste stream for rural and urban areas (% of the total volume of waste subject to analysis)

	Urban areas			Average values in urban areas	Average values in rural areas
	Chisinau	Balti	Leova /Causeni		
Paper and cardboard	8.00	2.80	5.10	5.30	2.60
Glass	8.10	5.20	5.10	6.10	3.10
Plastics	7.30	3.80	3.30	4.80	2.40
Metal	2.00	2.00	1.30	1.80	0.90
Kitchen waste	46.20	63.2	40.70	50.00	12.50
Garden/agricultural waste	4.30	5.00	22.96	10.80	21.50
Manure					40.70
Textiles	3.30	2.60	2	2.70	1.40
Footwear	0.60	0.20	0.30	0.40	0.40
Furniture	1.40	3.90	0.90	2.00	1.00
WEEE	1.700	1.00	1.00	1.20	0.60
Wood	1.90	1.90	0.60	1.50	0.70
Other (construction)	15.40	8.50	16.50	13.40	12.20
Total	100.00	100.00	100.00	100.00	100.00

Note: the share for the manure is equal in rural areas to the share of kitchen waste according to data obtained for Leova and Causeni rayons, where this type of waste has been reported but was included in the category of kitchen waste.

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1 Scope and methodology

The technical-financial evaluation is carried out in line with the classic evaluation methodology. The evaluation takes into consideration the current situation, tendencies of the sector and the envisaged level of sector development, presented in the SRP. The recommendations for the development of the regional waste management system have been analyzed in terms of:

- Waste storage and collection, including segregation of sources;
- Recovery of resources;
- Treatment;
- Landfills, transfer stations and transportation on long distances;
- Management of special sources of waste;
- Management and closure of the existing storage places.
- Waste management is at the initial stage of development in the Republic of Moldova. However, a number of activities were carried out in the last years, which provide good experience, including case studies that can contribute to the development of SRP in the DRC.

2 Criteria for technology selection

2.1 Envisaged level of sector development and objectives

When technical solutions and options are recommended, the envisaged level for sector development and the set targets are taken into consideration. These objectives are developed in line with the principles of safe waste management, taking into consideration the actions and terms set out in the Waste Management Strategy.

2.2 Existing infrastructure and installations available for treatment and storage

The technical analysis takes into consideration the existing infrastructure of waste management and the investments for extending and improving the waste disposal places. These are taken into consideration when future places for waste storage and for large stations of transfer in clusters of rayons that form the recommended areas of waste management are proposed.

The infrastructure and road quality will be taken into account to recommend the locations for waste storage places.

The locations for elements of the regional waste management system were not identified at the planning stage. They will be identified and specified during the feasibility studies and agreed under the legislation, after the Environmental Impact Assessment (EIA).

2.3 Adequate character of recycling and treatment technologies

Different recycling and treatment technologies are adequate in different economic, social, cultural contexts where the service is delivered. The recycling and treatment technologies that meet best the number of people serviced by the system, the amount and composition of waste flows and the level of accessibility are selected so as to correspond to the goals and objectives of the Waste Management Strategy.

3 Technologies used in the waste management process

This section presents a summary of waste management technologies that have been demonstrated and are applicable in the context of the Republic of Moldova. The following technologies are presented in a format that can be useful for the initiatives of public awareness raising and education:

- Selection and recycling;
- Composting;
- Biodigestion;
- Production of fuels obtained from waste;
- MBT stations;
- Incineration;
- Waste storage.

Every description includes a list of participants and required equipment for the operation, products (resources) and outcomes of the process, as well as applicability of the technology. The descriptions are not comprehensive and several variations of these technologies are used. The goal of these brief introductions is to understand the basis of technology and how it is applied to enable an informed selection of the technologies for the DRC.

3.1 Selection and recycling

Recycling is a key component of resource recovery and takes a leading role in the waste hierarchy being exceeded only by prevention (reduction and reuse of waste). Recycling starts with the separation and selection of materials, either at the production point or in a selection installation after the mixed collection, followed by different stages of the processes in which the secondary materials are extracted, cleaned, pressed, shredded and, finally, used as secondary material for production.

The highest quality of recyclable materials and, consequently, the highest incomes and the highest capacity to attract buyers for the recyclable materials is reached when the recyclable materials are separated at the source (e.g. the waste generator). The supply chain for recyclable materials can include numerous intermediate steps where the value grows either through a certain type of processing or through the sale of materials in bulk. Most often, recycling is performed for different types of paper and carton, ferrous and non-ferrous metals, plastic and glass, but also includes textiles, rubber, used oils, wood and furniture, more complex sources of waste, such as waste electrical and electronic equipment (WEEE), used batteries, old cars, etc.

Often, recycling is partially or totally the private sector's duty. The responsibility of the authorities for recycling refers more often to the consolidation of this sector by improving the logistics and the value chain, by providing larger quantities and better materials to the existing recycling industry. Thus, the real stages of the process that fit in solid waste management are related to selection, pressing, baling and/or crushing the materials.

3.1.1 Elements of a selection station

Subject to the design of the selection stations, they can be adequate for mixed waste or for waste that is segregated at the source. The selected technology can be more mechanized or more labor-intensive. The key elements are:

- The industrial shed, covered storage places, concrete platform for selection;
- Industrial scales for weighing the materials;
- Mechanic or manual selection, usually – on the assembly line;
- Different machinery used for separation, magnets for metals, screens, separators and containers;
- Waste treatment equipment, such as the washing line, grinder, pressers, glass grinder, etc.;
- Lifts.

3.1.2 Waste flows that can be accepted

Selected mixed waste or source for additional selection.

3.1.3 Outcomes of the process

The most frequently sorted waste are different types of paper and carton, ferrous and non-ferrous metals, plastic and glass, but also textiles, rubber, used oils, wood. Some sources of materials are more complex and require special procedures of collection, disaggregation and treatment; these include hazardous domestic waste, such as furniture, WEEE, used batteries, out-of-order vehicles, etc. They can be delivered to a selection facility and will be separated, stored and treated separately.

Some materials will be generated from the selection process as non-recycle waste and will require disposal in most cases, although some of them can be suitable for additional treatment (such as composting).

3.1.4 Applicability of this technology

The selection stations are most often used in places where there is no segregation of the sources or where the segregation of sources is at the initial stage or is performed only in two fractions. Even when there is already an infrastructure of segregation by sources on a number of fragments, because of the low level of awareness or lack of motivation, people might not separate the materials correctly and additional selection will be required in such cases. Subject to the specific needs, selection is required in a certain flow, for example, selection of various types of plastic materials or selection of materials by colors.

3.2 Composting

Composting is a popular method of treating domestic waste and food waste. Organic residues can be transformed from waste into useful fertilizers for the soil through composting. Composting is a biologic process of disintegration of organic waste in the presence of oxygen into a stable mixture called compost.

3.2.1 Technology elements

Composting is performed in case of large volumes of organic waste. This method is based on an increased level of nitrogen that supports the development of bacteria, which will generate high temperatures required for the safe production of a compost

product. The process requires maintaining the air in the system and monitoring the moisture level.

The main elements of the technology include: an industrial platform or, for more mechanized systems, a building; raking machinery or other equipment for aeration, screens and crushers, mobile equipment for materials in motion.

3.2.2 Waste flows that can be accepted

A variety of biodegradable waste flows can be accepted in composting: food residues (from households, restaurants, canteens), waste from public markets (only biodegradable materials), waste from gardens and parks (from private gardens, parks and public places), wood waste (not furniture or large domestic waste).

In many farms, the basic ingredients for composting are the stable waste produced at the farm and other agricultural waste.

3.2.3 Outcome of the process

The product of this process is the compost that is to be used in agriculture. The compost can be of very high quality if it is produced of segregated materials or of lower quality if the contamination of waste flows is admitted. In this case, the compost can only be used for certain goals, such as for rehabilitating the contaminated places or as compost for energy cultures.

3.2.4 Applicability of the technology

This technology is relatively cheap and flexible, because it can be applied at different scale, subject to the needs. Some of the first buyers of the compost are usually the divisions of local authorities in charge for the maintenance of public green spaces.

3.3 Anaerobic digestion

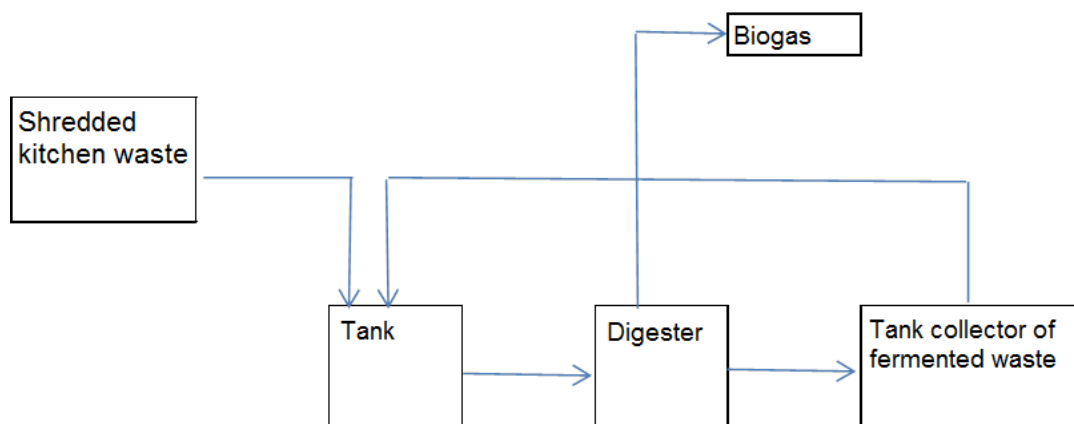
The Anaerobic Digestion (AD) is a natural process whereby the microorganisms disintegrate the organic matter, in the absence of oxygen, in biogas (a mixture of carbon dioxide (CO₂) and methane) and digestate (a fertilizer rich in nitrogen). The biogas can be used directly in combined engines for heat and electricity, can be burned down to produce heat or can be cleaned and used in the same way as the natural gas or as fuel for vehicles.

3.3.1 Technology elements

The basic elements of the investment are:

- The grinder or other equipment for waste pre-treatment;
- Food tanks, heated fermentation tanks, tank for the collection of digestion products;
- Equipment for monitoring the biogas production.

Figure 3-1: Schematic diagram of an anaerobic fermentation system



The digester can be moist or dry, mesophilic or thermophilic, with one stage or with several stages. The dry AD uses only minimum mechanic selection, while the digestion process takes place from solid waste.

3.3.2 Waste flows that can be accepted

To produce energy, a variety of organic materials can be used, such as food waste from internal and industrial sources, stable waste and residues, sludge from treatment stations and cultures cultivated for energy production. Agricultural waste and sludge from treatment stations can be used, while the use of domestic waste has not proven its efficiency yet.

3.3.3 Outcome of the process

The anaerobic digestion results in the biogas that provides energy. It consists of about 60% methane and 40% CO₂. At present, it is mainly used to generate electricity for local use and to supply energy in the national power network. Beside energy production, it produces digestion products. This is a valuable bio-fertilizer that can be used as a renewable source of critical resources, such as nitrogen and phosphor.

3.3.4 Applicability of the technology

The stations can be built at different scale, from large installations for treating the sludge of treatment stations or the municipal waste to smaller installations for manipulating materials from a specific agricultural exploitation.

3.4 Mechanic-Biological Treatment (MBT)

This technology refers to the treatment of mixed waste to stabilize the organic waste and can also include the recovery of materials for recycling or other purposes.

3.4.1 Technology elements

An essential advantage of MBT is that it can be configured to achieve a number of different objectives. Some typical objectives of MBT installations are:

- Pre-treating waste that reaches the landfill;

- Discharging non-biodegradable and biodegradable solid waste from landfills through the mechanic selection of solid municipal waste in materials for recycling and/or recover of energy as fuel obtained from waste;
- Treating biodegradable solid waste by: reducing the dry mass of organic waste before storage, reducing the biodegradability of organic waste before storage, stabilizing into a product similar to the compost to be used on the field, transforming into combustible biogas to recover energy and/or dry materials to produce an organic fraction with high calorific value for use as fuel obtained from waste.

3.4.2 Necessary equipment for exploitation

The MBT usually involves the following equipments that can be provided in the form of a package to meet the specific treatment requirements:

- Process preparation: grinder, revolving drum, ball breakers;
- Waste separation: large jiggers (paper, plastic), manual (plastic), magnetic (non-ferrous metals), separation of rotational currents (non-ferrous metals), moist separation for different densities (plastic, organic, stone, glass), air classification for weight, optical (for special polymers);
- Biological treatment, the used biological processes are: aerobic bio-drying, aerobic composting in container or anaerobic digestion.

3.4.3 Waste flows that can be accepted

The following waste flows can be treated through the MBT:

- Mixed domestic waste, as well as commercial and industrial waste;
- Recoverable elements: ferrous metals, non-ferrous metals, plastic, glass.

3.4.4 Technology output

The following outputs are obtained from the MBT:

- Recyclable materials, such as metals, paper, plastic, glass, etc.;
- Non-usable materials (inert materials), safely disposed at the sanitary landfills;
- Biogas (anaerobic digestion);
- Fuel produced of waste and organically stabilized (high caloric fraction).

3.4.5 Applicability of the technology

The capital and operational costs of the MBT can be relatively high as compared to the alternative technologies in waste management. As a result, the technology was often not adopted at a large scale, unless there are pressures from the regulatory bodies (e.g. regulatory requirements for treating organic waste before disposal).

The fuel produced by MBT installations is often burned down to produce energy in installations that are not adequately regulated or monitored in terms of emissions in the atmosphere air. In these cases, the production and burning of fuel can cause significant harm to health and environment, because of pollutants emitted in the air. Accordingly, the use of MBT to produce fuel is not relevant for the Republic of Moldova.

In Europe, the capacity of MBT installations can vary from 10,000 tons per year to 250,000 tons per year for large installations.

3.5 Fuel obtained from waste

The fuel obtained from waste covers a large range of waste categories that has been treated to meet the guidance, regulation specifications in the industry, mainly, to obtain a high caloric value. Subject to the composition, these can be used in different industries (furnaces, cement plants, power plants).

3.5.1 Technology elements

One of the less expensive and well established technologies for the production of fuel out of waste is the mechanic-biological treatment. An MBT station separates metals and inert materials, identifies organic fractions (using composting processes with or without a digestion phase for stabilization) and separates fractions of high caloric power for fuel.

3.5.2 Waste flows that can be accepted

The following types of waste can be used to produce fuel:

- Residues from recycling solid municipal waste, industrial/commercial waste, sludge from treatment stations, hazardous industrial waste, biomass waste;
- Plastic and biodegradable waste from solid municipal waste, materials waste with high caloric values;
- Wood, paper and plastic waste.

3.5.3 Outcome of the process

Products can consist of fractions of 10-30 mm. Waste is often bladed before use, introduced in containers or stored in bunkers.

Subject to the initial composition of the treated waste, about 10-20% of solid municipal waste can be transformed into fuel. The rejected waste is thrown to a landfill.

3.5.4 Applicability of this technology

This technology is used in a number of EU countries to support recycling and treatment of organic waste. However, the use of fuel made of this type of waste is a controversial subject, because different toxic gases can be emitted in the process of burning (including dioxins and furans) in the atmosphere. In many countries, including the Republic of Moldova, the regulatory and monitoring framework for the polluters of the atmosphere air is not sufficiently developed to ensure the burning of fuels safely obtained from waste. Therefore, the use of MBT for fuel production is not recommended.

3.6 Incineration

Incineration is a thermal process of waste disposal that implies the burning of organic substances. Waste is transformed in ash, gas and heating. Incineration reduces the initial required volume of waste disposal to 90%. The generated energy can be used for heating systems. The burning gas cleaning equipments are also used in modern incinerators. Incomplete incineration can produce gas of carbon monoxide, gas dioxins and/or other harmful substances. The incineration with energy recovery is considered a

recovery operation. However, the incineration without energy recovery is considered a storage operation.

3.6.1 Elements of the incineration technology

The incineration technologies differ, especially, by the type of incineration plant:

- The mobile incineration plant is the most spread type of plant. It ensures a very efficient burning process due to the high temperature and well mixed fuel;
- Fluid environment. Incineration in a fluid environment is achieved in a framework with sand where waste is just a part of the furnace material.

The cleaning of the burning gas is always part of the process. There are several processes that can reduce the quantity of pollutants. The gas cleaning filters can be divided in several types: cyclone, electric filter, textile filter, moist purifier.

The energy can be recovered from incinerators. Water is usually transformed in steam that can be used directly, in case there is a steam installation nearby or can be used to generate power.

3.6.2 Waste flows that can be accepted

The following waste flows are suitable for incineration:

- Specific hazardous waste in which pathogen and toxic substances can be destroyed under high temperatures;
- Special industrial waste, such as hydrocarbon residues, tar, used solvents and paint sludge that can be transformed in heat or power in special incineration installations or cement installations;
- Agricultural waste, such as wheat, corn and rice straw;
- Agricultural-industrial waste produced by sugar and oil mills;
- Domestic and similar waste generated by commercial and industrial units.

3.6.3 Applicability of this technology

This technology is applicable in countries where the focus is on the reduction of the volume of waste. However, an incineration installation requires large investments and expenses, which impeded the wide spreading of these installations in the EU countries in the previous decade. In addition, incineration may not be compatible with the recycling programs, since the most wanted materials for recycling (e.g. plastic, paper, carton) are required also for the incineration process due to their high energy value. In countries like Moldova, where solid municipal waste includes a high percentage of organic waste, the combustible value of waste to be incinerated is so low that its burning cannot be supported and requires the use of fuel in the incineration process and the growth of operating costs.

3.7 Sanitary landfills

Irrespective of the degree of waste treatment in different technologies, there will be a specific amount of waste that will need storing. The sanitary landfill is the technology used in the modern waste management systems, used for waste burial. If it is performed in line with the standards, sanitary storage is an economically efficient and environmentally safe method of waste storage. If sanitary storage includes the storage of

organic waste, the recovered methane (that results from the degradation of organic waste) can be feasible.

3.7.1 Elements of sanitary storage technology

Sanitary storage includes the following elements:

- Enclosure used to control the access to the territory and delimit the installation;
- The scales used to check the amount of waste that is collected and brought by vehicles;
- The obturation of the base that implies creating an impervious layer that impedes the leakage of the leachate from landfills and enables its collection for purification;
- Device for collecting and purifying the leachate. The edges of every landfill have a lower surface where any formed liquid is collected from. This leachate must be disposed and then purified in a water purification station;
- Rain water collection system specially arranged to control water leakages during the rains or snow meltdown before its elimination from the territory;
- Collection and bulging of storage gas. The storage gas is produced when the bacteria from the landfill disintegrate the waste in the absence of oxygen. The gas must be taken out of the landfill using a series of collection pipelines and then specially purified; the methane of the storage gas can be used to generate power;
- Station for monitoring underground waters, used to monitor the level and quality of water before and after they went through the storage area. This is to ensure that the underground water has not been contaminated;
- Cap or cover for waste isolation.

3.7.2 Equipment required for exploitation

The following machines are usually used for the exploitation of a landfill:

- Compactor, used to spread the waste in layers over the dump hole;
- Loader to apply covering materials (e.g. soil, construction waste), to prevent smells;
- Systems to control/purify storage gas and leachate.

3.7.3 The best exploitation practices

Compaction and daily coverage with soil or inert waste. The alternative coverage materials are temporary layers, hewed wood or various products from pulverized foam. Waste compaction is essential for the arrangement of the landfill.

At the end of its operation duration, the landfill must be rehabilitated.

The superior layer of the landfill is essential for ensuring the isolation between waste and the environment and for preventing the infiltration of water to reduce the generation of leachate. Moreover, the superior layer is used to control the leakage of gas or to support vegetation.

3.7.4 Waste flows that can be accepted

Storage is suitable for storing solid, non-hazardous waste. Liquid waste must not be stored in landfills. The EU Directives stipulate total prohibition on the storage in sanitary landfills of biodegradable waste to reduce methane emissions.

3.7.5 Applicability of this technology

In the 27 member states of the EU, almost 40% of solid municipal waste are stored, although in some countries (especially in central and Eastern Europe) a higher percentage of waste is stored. The European countries contain over 150,000 sanitary landfills.

4 Recommended combination of technologies

4.1 Collection

The goal of covering the population with waste collection services is to reach 100% in urban and rural areas of the Republic of Moldova. In urban areas, the collection is performed with outdated equipment, which needs to be renewed, both the containers and the vehicles to improve the service standards and their efficiency. This will reduce the problems related to the inadequately accumulated or collected waste in outdated containers, as well as to the smells and waste formed during the transportation of waste in open vehicles in urban areas.

The recommended technical solutions are differentiated between urban and rural areas from the point of view of collection, used equipment and frequency of collection. Every region is currently serviced either by private or public companies operating in the cities of every rayon and provides waste collection and storage services to the corresponding regions.

The growth of the waste collection rate and of the service quality is a priority in the short term, so that the focus will be on extending and modernizing the mixed collection, in parallel with the segregation of the source and separate waste collection.

The urban waste collection will be carried out twice a week in the areas of apartment blocks and once per week in the area of individual houses. The mixed collection method will be applied for the apartment blocks, which means that containers of 1.10 m³ will be installed on the waste collection platforms. For individual houses, the selective collection method will be used, i.e. every house will use standard plastic containers of 0.24 m³. The mixed rural collection will be performed once every two weeks. The recommended method is the common collection, where every resident must cover a comfortable distance to take his/her waste in the common container. The common containers of 1.10 m³ will be located within 200-300 meters in rural areas.

The collection equipment used in the Republic of Moldova largely consists of old tractors and trucks with trailers, often without compaction and sometimes with manual control. In very few cases, the collection and transportation services are provided with modern trucks with compactor. It is recommended that the old collection equipment is replaced with trucks with compactors of 16 m³, recommended for the mixed collection in urban areas and 10m³ in rural areas.

For urban areas, the separate collection of 2 fractions using 2 separate containers is recommended. The dry container is used to collect recycle waste, such as plastic materials, paper, glass and metals. The moist container is mainly used in areas with organic waste, such as kitchen waste, garden waste and other waste flows that are not recyclable and are not part of special flows, such as textiles, rubber, etc.

The collection with segregation of the source in two fractions can be considered a step toward developing the separation of the source where the population is actively involved in using the benefits of source separation. After a period, the system can be transformed into a source of segregation in a number of portions.

At present, the PET and different types of plastic will continue to be collected separately in rural areas, in line with the current experiences since paper is used for heating, while the glass and metal are sold by private collectors.

The vehicles that can be used for transportation can be collection trucks with two compartments or separate trucks for every fraction.

Figure 4-1: Waste containers



The containers will be located in densely populated areas and can have the form of a bell or a regular form, depending on the preferences. In some cities of Moldova, metallic cages are used to collect PET, which is a relatively cheap solution since they can be used permanently.

4.2 The transfer and transportation system

Currently, almost every community has its own landfill. Most of these landfills are uncontrolled, although some of them have been recently modernized and transformed in controlled or semi-controlled landfills. It is important that the waste management system of the Republic of Moldova is regionalized to reduce pollution caused by numerous storage places and to provide scale economies from the recovery of resources, treatment installations and landfills that are planned and discussed in the following section of this document.

The waste transfer stations are installations where solid municipal waste is discharged from collection vehicles and is kept for short periods until it is loaded on long-distance transportation vehicles that are used to transport the waste to sanitary landfills or other treatment or disposal installations.

These stations contribute to higher efficiency of the exploitation costs through the reduction of costs related to the waste transportation to a landfill/treatment place, because they reduce the overall number of departures to and from the final destination and enable the transportation of waste in larger quantities, in long-distance trucks.

Given the distances, road condition and density of the population (waste generation rate in a specific area), the design of an average transfer station in the Republic of Moldova requires that it is located at about 25-30 km from the communities it services. A transfer station will service about 5-10 communities. The capacity of the transfer station will depend on the number of serviced residents and the produced waste. The waste is brought by collection trucks to the transfer station and loaded in intermediate containers of 30 m³ or 40 m³ subject to the volume of waste that the transfer station will receive. These containers are designed so as to be fitted for platform trailers. The containers will be taken by larger vehicles with trailers that can transport up to 2 containers of this type.

The transfer stations will also operate as collection points for recyclable materials, hazardous domestic waste, WEEE and gross waste. These types of waste will be stored

separately from mixed waste, in adequate containers, on a platform in the transfer station. These waste flows are taken over by companies specialized in hazardous waste recycling or treatment or, if the quantities are not sufficient, they will be transported to a larger transfer station.

The size of transfer stations will depend on the population serviced by each of them. The large transfer stations will be equipped with a small office building and an installation for selection of recyclable materials.

The location of transfer stations will be identified during the feasibility study that will represent the first step in implementing the regional plan.

4.3 Recovery of resources

4.3.1 Recyclable materials

It is envisaged to install selection centres in the large transfer stations and landfills to treat the dry fraction. These installations are required to reach the resource recovery objectives on the short term. The selection installations are required to sort the metal, paper and carton, different plastic, glass, etc. items. The selection installations enable several stages of mechanic treatment (e.g. pressing or shredding materials), but the selection of dry materials will, first of all, be a manual task.

The WEEE is a special and complex source of waste. The first step in collecting the WEEE will serve the mobilization of national campaigns. The transfer stations will play the role of collection points for this waste and will store it temporarily. The companies specialized in disintegrating and recycling waste are usually private and will take this waste from the transfer stations or will take part in the national collection campaigns.

The construction and demolition waste is not part of the flow of municipal waste, but in the Republic of Moldova it is manipulated together with municipal waste. One or two recycling installations are envisaged per regional landfill to recycle this waste. The materials obtained from recycling are suitable to cover and/or rehabilitate old landfills or can be used in road construction, etc.

4.3.2 Composting

Composting is a suitable solution for the Republic of Moldova, which is a predominantly rural country where agriculture is important and has a significant potential of development. This is valid especially for “biological” and “ecologic” products, because the traditional subsistence agriculture continues to be practiced and the climate is favorable. The composting installations are being developed throughout the Republic of Moldova, and awareness raising campaigns are held for this purpose. Through these initiatives, farmers are encouraged to use biodegradable waste for composing.

It is recommended that the composting installations for treating green waste and agricultural waste are built within or near agricultural areas, because these are the places where the appropriate raw material is generated in the largest quantities and where there will be demand for the compost. This will contribute to extracting organic waste from municipal waste and other flows of biodegradable waste stored in the storage places.

Beside these initiatives, it is important to continue raising the awareness regarding the small-scale benefits of composting, especially, in rural areas. This is a traditional practice that must be consolidated and improved.

Initially, the moist fraction of domestic waste – including the organic materials contained in waste – will be stored in regional landfills. The opportunities for recovering the value from this waste will be feasible in the long term. However, one of the first steps required in the large-scale use of mixed biodegradable waste will be the development and enforcement of treatment standards for these materials. These standards are required to protect public health and the environment from the unpleasant and hazardous impact that can be associated with the treatment of biodegradable waste.

4.4 Biodigestion

Anaerobic digestion is an alternative to composting, because it leads to energy production. In some areas, the demand for energy might be higher than for the compost. Moldova already focuses its attention on the use of biomass and of agricultural waste to produce thermal energy. There are a number of local programs and initiatives for energy generation of agricultural waste, such as straw, hay, etc. This is due to the fact that the local biomass potential is very good and the Republic of Moldova lacks natural resources, such as methane or coal that can be used for heating.

Therefore, it is recommended to take into consideration the possibility of using biodigestion installations where large quantities of agricultural waste or sludge from treatment stations are available and where the markets for the biogas produced in the biodigestion process can support large investments and operating costs of the technology.

4.5 Other treatment methods

Both the MBT and incineration can be considered when treating the waste. The relevant factors regarding the incineration include:

- The capital and operating costs are very high;
- The incinerators are most efficient when the waste that they incinerate is dry and has very high caloric value. The waste from the Republic of Moldova is moist and has low caloric value, therefore additional fuel will be required to maintain an adequate process of burning;
- Although the energy can be recovered from the incineration process, the high cost of technology exploitation and the high demand of additional fuel lead to the conclusion that incineration is an extremely expensive method of energy production and an extremely expensive method of waste treatment;
- The costs of incinerators maintenance are high and the incinerators cannot be safely operated in the absence of rigorous maintenance;
- The incinerators are intended for materials that are not recycled. A large number of workplaces can be created due to recycling thus stimulating the development of local economy. The incineration process creates few jobs.

These are the reasons why incineration is not recommended for the Republic of Moldova.

The relevant factors regarding the MBT include:

- Although all waste can be treated through the MBT, the quality of recovered materials is low for recycling. This means that the materials cannot impose a higher cost on the recycling market;
- The organic materials that are recovered in the MBT processes are of too low quality for composting. In addition, these materials are often contaminated with different pollutants. For instance, the plastic foil and the glass can be contaminat-

ed with hazardous waste that is placed in the flow of municipal waste (e.g. the used oil, used solvents, etc.). However, the volume of organic waste can be reduced and stabilized through the MBT processes to reduce the impact of waste from the landfill or to create stable material that can be used to cover the landfill;

- The recovery of materials to obtain fuels by using MBT faces similar issues to those typical of incineration: the waste is moist and has low caloric value so that it needs to be dried before sale as high quality fuels. This is an expensive process;
- The markets of waste-based fuels are not safe. Many industries have used fuel obtained from waste as a source of fuel, but without having the appropriate control of environmental factors to prevent toxic emissions. Consequently, the pressures related to regulation can lead to the disappearance of a market and the materials that have been produced at high costs will need to be disposed into a landfill.

For these reasons, the MBT is not recommended for the Republic of Moldova for the short term to recover the materials, but will be taken into consideration as part of ongoing development of the waste management system in the context of reducing the volume of waste and the impact on the environment of waste intended for disposal in the “transition” period when the number of landfills will be reduced (in line with the Waste Management Strategy), and the modern sanitary landfills are not commissioned yet; in the long term, the following requirements are imposed for “transitional landfills”:

- Development of an adequate national regulatory framework that will regulate the operation of MBT; and
- Safe implementation of an integrated system in the field of waste management.

A pilot project proposed for development in Soldanesti would demonstrate the technical and financial viability of the MBT equipment in the Republic of Moldova to treat waste before disposal. The effectiveness of this pilot project should be monitored and evaluated independently, and the learned lessons can be applied in other communities of Moldova.

In Chisinau, significant private investments have already been made in an MBT installation. However, the operator has no contract signed and does not treat the waste. It is not clear whether the investment is profitable.

4.6 Storage locations and sanitary landfills

The disposal of waste on the soil is part of waste management in all the countries. The disposal of waste on the soil can have serious effects on public health and on the environment when it is not preceded by an adequate examination of the waste impact. On the other hand, the application of modern environmental standards ensures that waste disposal protects public health and the environment. Therefore, the sanitary landfills will be part of the regional waste management system. However, with the progresses achieved in reusing the waste, progressively smaller quantities of waste will require storage and, finally, the sanitary landfills might become unnecessary.

Every area of waste management will be serviced by a single sanitary landfill. The size of the landfill that will be required depends on the volume of waste that requires disposal. As a result of resource recovery and waste treatment, a smaller quantity of waste will be stored in the short term and an increasingly larger quantity of waste will

be stored in the medium and long term. This is taken into account when calculating the capacity of the landfill.

The waste management strategy stipulates that the existing landfills will be closed down and a small number of “improved transition locations for waste storage” will be established in every rayon, until the construction of sanitary landfills. The improved transition locations for waste disposal must meet the following criteria with a view to minimize their impact on the environment:

Compliance with the requirements set out in the typical technological scheme of landfills approved by order no. 67 of the Ministry of Environment and Territory Development of RM of 2001;

At the same time, if the above mentioned requirements are not met, the waste should be pre-treated through the MBT process before disposal.

5 Quantities and morphologic composition of waste

The forecasts regarding waste management depend on two important variables: population and economic situation in the area the forecast is made for. To make a population forecast, the data of national Statistics on the population in the last 10 years has been collected and analyzed. On the basis of this information, a national annual rate of decrease of 0.2% has been calculated and applied to forecast the population.

The economic development will allow covering higher expenses and higher consumption level, which will determine the growth of the quantity of waste generated per household. In line with the Waste Management Strategy, the GDP is estimated to grow to about 5% per year. The national GDP is strongly influenced by the city of Chisinau that is the most developed city and the centre of economic activities. In other areas, the economic development is not expected to be as significant as in Chisinau and an annual average growth of the GDP of 2.5% is forecast in other regions of the country.

Based on this, Table 5-1 identifies the waste generation rate that is forecast both for the DRN and DRC.

Table 5-1: Estimated waste generation rate

Variables		2012	2013	2014	2015	2016	2017	2018
GDP	EUR/person/year	2,893	2,921	2,949	2,978	3,007	3,036	3,066
Average waste generation rate	kg/person/day	0.551	0.565	0.579	0.593	0.608	0.623	0.639
Waste production rate in urban areas	kg/person/day	0.735	0.753	0.772	0.792	0.811	0.832	0.852
Waste production rate in rural areas	kg/person/day	0.525	0.538	0.552	0.565	0.58	0.594	0.609

The waste composition for DRC has been assessed taking account of the data presented by the “Completing the third national communication, in line with the Framework-Convention of the United National on Climate Changes” Project funded by the UN. The project was implemented in February – December 2012 and the waste composition was analyzed for 4 waste storage locations: Chisinau, Balti, Leova and Causeni. For each of these locations a set of 4 analyses was conducted to analyze the waste composition in different seasons. These analyses were conducted in March, June, September and November 2012. This information was then linked with data on waste composition in neighboring regions of Romania and the conclusion of experts based on their observations made in the field. Table 5-2 presents the morphologic composition of waste.

Table 5-2: Estimated composition of waste

Type	Average in urban areas [%]	Average in rural areas [%]
Paper and carton	5.29	2.65
Glass	6.12	3.06
Plastic	4.78	2.39
Metals	1.78	0.89
Kitchen waste	50.04	12.51
Garden waste / agricultural waste	10.75	21.51
Stable waste	0.00	40.74
Textiles	2.73	1.37
Shoes	0.38	0.38

Furniture	2.04	1.02
WEEE	1.20	0.60
Wood	1.45	0.73
Other (construction)	13.45	12.20
Total	100.00	100.03

The morphologic composition of waste from rural and urban areas indicated above highlights the percentage of materials that are disposed as waste from the Republic of Moldova. These results are used to identify specific demographic areas that have potential for different technologies such as composting or recycling.

Table 5-3 and Table 5-4 present the morphologic composition of waste, estimated in terms of the collection system with 2 containers (moist/dry) that is recommended in urban areas, as well as in terms of the collection system recommended for rural areas. In Table 5-4 the moist fraction contains kitchen and garden/agricultural waste, while the rest of waste is attributed to the dry fraction of waste.

Table 5-3: Composition of collected urban waste

Type	Percentage
Dry fraction	34.40
Moist fraction	60.80
Plastic	4.80
Total	100.00

Table 5-4: Composition of collected rural waste

Type	Percentage
Agricultural and stable waste	62.20
Plastic	2.40
Other waste	35.40
Total	100.00

6 Definition of waste management areas

Regional waste management implies that different communities use the same waste management installations and equipment. Some waste management installations and equipment are jointly used by some communities while other waste management installations and equipment are jointly used by other communities. For example, a transfer station can be jointly used by some communities while other communities can be serviced by other transfer stations. However, all the communities from a waste management area are serviced by the same sanitary landfill for waste disposal. Therefore, a waste management area is defined as a geographic area and the communities of this area are serviced by a single sanitary landfill. This is why it is necessary to define the most appropriate arrangement of the waste management areas.

The most appropriate differentiation of waste management areas will be the arrangement whereby all the communities are serviced at a lower average cost. It is necessary to calculate the cost of waste transportation and disposal according to different possible scenarios.

Three possible scenarios have been developed for every waste management area. They are identified in Table 6-1 for every scenario and the rayons included in a regional waste management area are highlighted.

Table 6-1: Scenarios regarding the waste management areas

Scenario A1	Scenario A2	Scenario B	Scenario C
Region Centre			
Ialoveni	Ialoveni	Anenii Noi	Hincesti
Anenii Noi	Anenii Noi	Criuleni	Ialoveni
Criuleni	Criuleni	Dubasari	Anenii Noi
Hincesti	Hincesti	Orhei	
Dubasari	Dubasari		Orhei
Straseni	Straseni	Ialoveni	Calarasi
		Straseni	Nisporeni
Calarasi	Calarasi	Hincesti	Straseni
Nisporeni	Nisporeni		Criuleni
Ungheni	Ungheni	Calarasi	Dubasari
		Nisporeni	
		Ungheni	Rezina
Telenesti	Telenesti		Soldanesti
Rezina	Rezina	Telenesti	Floresti
Soldanesti	Soldanesti	Rezina	Soroca
Orhei	Orhei	Soldanesti	
	Floresti	Floresti	

In this table, scenario A corresponds to the waste management areas that are recommended in the Waste Management Strategy. An option for this arrangement has also been taken into consideration to reflect the possible interest of the communities of Floresti to join a waste management area that would include the Soldanesti, Rezina, Telenesti and Orhei rayons. The rayon clusters presented in scenarios B and C have

been developed as alternatives to scenario A with a view to identify whether lower costs might be achieved by changing the classification of clusters recommended in the Waste Management Strategy.

The analysis of every scenario considered the following:

- The population that is to be serviced and the related volumes of waste that is to be managed;
- The distance that waste will need to be transported over taking into consideration the local road condition, only the highways and national roads being considered suitable for long-distance waste transportation;
- The waste transportation conditions, including the role of transfer stations and the capacity of the waste transportation equipment;
- The unit costs for waste transportation and disposal.

Beside the above mentioned analytical considerations, it is also necessary to select the final point of the transportation system – the location of the sanitary landfill. These places will be identified during the feasibility study. To calculate the transportation and storage costs at the planning stage, a location for the landfill has been identified in each of the above scenarios.

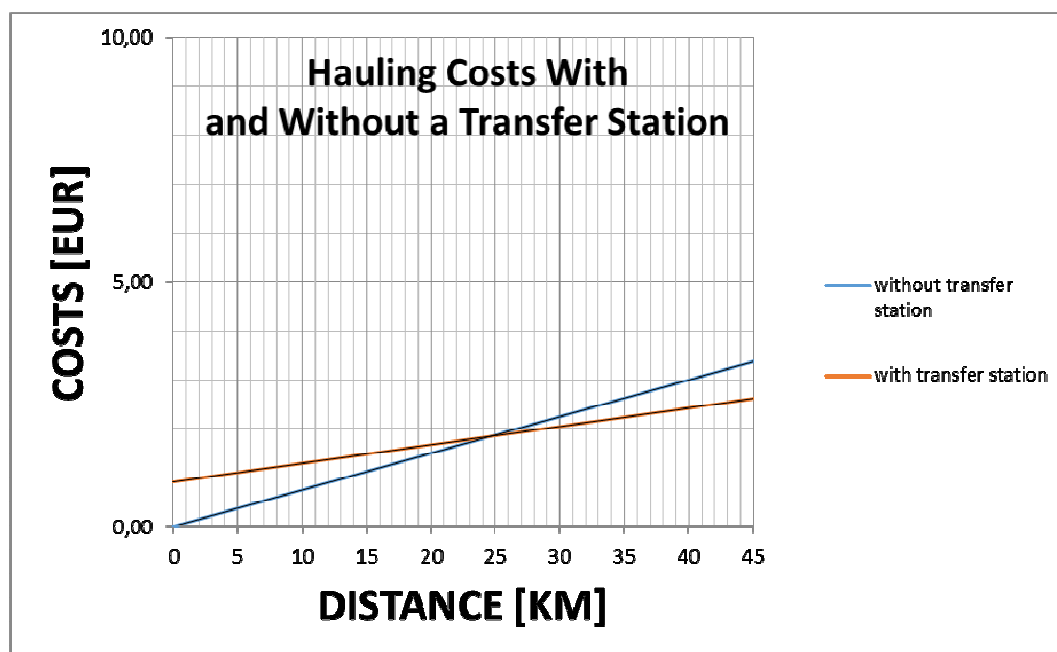
The first aspect in the analysis refers to determining the role that the transfer stations have in the waste management system according to each of these scenarios. The transfer stations and the long-distance transportation of waste reduce the costs of waste management as compared with the long-distance transportation in waste collection vehicles. Table 6-2 identifies the data used for this assessment.

Table 6-2: Data used to assess the transfer stations

Indicator	EURO, ton/km	Values
Transportation costs without a transfer station	EURO/ton/45km	3.37
Distance to the landfill	km	45
Costs of transportation by truck	EURO/km	0.45
Transported waste	ton	6
Transportation costs with a transfer station	EURO/ton/45km	2.61
Cost of the transfer stations	EURO/ton	0.71
Distance to the landfill	km	45
Costs of transportation by truck	EURO/km	0.76
Transported waste	ton	18

This data is used to identify the costs of transportation with waste collection vehicles and of long-distance transportation (Figure 6-1). As presented in this figure, the costs are lower in case of waste transportation directly to a landfill when it is within 24 km from the waste generation point. When the distance to the waste storage place is longer than 24 km, it is less expensive to use the long-distance vehicles. Therefore, it is envisaged that the transfer stations will be used for waste transportation when the distance to the landfill exceeds 23 km.

Figure 6-1: Costs of transportation with and without a transfer station (EURO/km)



To make sure that the analysis of regional waste management scenarios reflects the actual conditions at local level, it is necessary to identify the probable investment and operating costs for each scenario. The cost elements include investment and operating costs associated with:

- Transfer stations where these might be necessary;
- Containers for waste transportation from transfer stations;
- Vehicles that will transport the waste;
- Sanitary landfill for waste storage.

The costs of each of these elements depend on:

- The volume of waste that requires management in any of these scenarios; and
- The performance criteria associated with waste management, which are:

Table 6-3: Performance criteria associated with waste management

Maximum weight of the short-distance vehicle (collection truck)	[m ³]	16
Maximum weight of the long-distance vehicle	[m ³]	60
Container for the transfer station	[m ³]	30
Density of waste in the compaction truck	[ton/ m ³]	0.6
Density of waste at a transfer station	[ton/ m ³]	0.3
Average speed of a short-distance transportation vehicle (collection truck)	[km/h]	25
Average speed of a long-distance transportation vehicle	[km/h]	40
Average distance to the transfer station	[km]	24

The estimative operating costs have been calculated for each of the above mentioned regional waste management scenarios. These estimates are specific for the quantities of waste that must be managed in each of the scenarios and for the requirements re-

garding the transfer/long-distance transportation, as well as regarding the sanitary landfills associated with each scenario.

The results of this analysis are presented in Table 6-4.

Table 6-4: Estimated costs of waste management in different scenarios

Sce-nario	Rayons	Waste ma-nipulated per year [tons]	collec-tion trucks	Option for landfill	Transfer stations	Long-dis-tance trucks	Cost of in-vestment [Euro]	Operating cost/year [Euro]	Operating cost /ton [Euro]
A1	Ialoveni	83,370	22	Merenii Noi	18	5	7,805,400	2,049,000	24.51
	Anenii Noi			Bubuieci	18	5	7,805,400	2,049,000	24.51
	Criuleni								
	Hincesti								
	Dubasari								
	Straseni								
	Calarasi	47,809	13	Ungheni	8	2	5,211,900	1,323,000	27.67
	Nisporeni			Sipoteni	8	3	5,351,900	1,378,000	28.82
	Ungheni								
	Telenesti	51,420	10	Mitoc	16	2	5,700,800	1,531,000	29.77
	Rezina			Soldanesti	16	3	5,774,800	1,587,000	30.86
	Soldanesti								
	Orhei								
A2	Telenesti	66,358	14	Mitoc	19	3	6,756,450	1,859,000	28.01
	Rezina			Soldanesti	19	4	6,854,450	1,912,000	28.81
	Soldanesti								
	Orhei								
	Floresti								
B	Anenii Noi	54,044	13	Mitoc	13	3	5,780,150	1,555,000	28.63
	Criuleni			Merenii Noi	13	3	5,780,150	1,555,000	28.63
	Dubasari								
	Orhei	52,995	14	Lapusna	10	2	5,512,500	1,421,000	26.43
	Ialoveni								
	Straseni								
	Hincesti	44,369	10	Soldanesti	14	2	5,306,700	1,420,000	32.30
	Telenesti								
	Rezina								
C	Soldanesti	50,087	14						
	Floresti								
	Drochia								
	Hincesti	82,295	20	Mitoc	18	5	8,427,400	2,403,000	28.81
	Ialoveni								
	Anenii Noi								
	Orhei	51,935	13						
C	Calarasi								
	Nisporeni								
	Straseni								
	Criuleni								
	Dubasari								
C	Rezina	51,935	13	Soldanesti	14	3	5,861,700	1,589,000	29.96
	Soldanesti								
	Floresti								
	Soroca								

The preliminary options include the locations to make the calculations, but the specific locations for sanitary landfills will be selected during the feasibility study.

Table 6-5 presents the summary of annual operating costs of waste management for every scenario.

Table 6-5: Estimated annual operating costs of the scenarios

Scenario	Waste manipulated per year [tons]	Average total annual operating cost [EURO/year]	Average annual operating cost per ton [EURO/ton]
A1	375,673	9,325,000	24.82
A2		9,435,000	25.11
B		10,551,000	28.09
C		10,889,000	28.99

As shown in the table, a volume of 375,673 tons/year of waste will have to be managed in the DRN and DRC per total. The options for the management of this volume of waste are presented in Scenario A1, A2, B and C in line with the above mentioned scenarios. The annual operating costs for the management of this waste vary and are higher for certain scenarios than for others.

The cost difference between the scenarios is determined by the fact that the transportation distance and the transportation costs vary, the opportunities for cost reduction via the transfer stations vary and the requirements for waste storage vary. The A1 scenario seems to imply the smallest costs – it is the scenario that reflects the waste management areas that are recommended in the Waste Management Strategy as the one that implies the lowest costs among the assessed scenarios. However:

- The differences between the costs of Scenario A1 and Scenario A2 are too small, while the Scenario A1 presents the lowest cost;
- In line with the legislation on local public administration, LPA have the exclusive right to decide on their participation in a regional waste management system and which other LPA outside the system might take part in the management of this system.

The implementation of regional plans should take place after the development of feasibility studies and of the project documents. The limits of waste management areas recommended in the SRP for waste management should be checked and adjusted depending on the arrangements that the LPA might make during the development of feasibility studies.

7 Regional waste management in the DRC

As set out in the previous section, the Scenario A1 is the least expensive option for the DRC. Scenario A1 defines three regional waste management areas in the DRC:

- Waste management area no. 1: Hincesti, Ialoveni, Anenii Noi, Criuleni, Straseni, Dubasari;
- Waste management area no. 2: Calarasi, Ungheni, Nisporeni;
- Waste management area no. 3: Rezina, Orhei, Soldanesti, Telenesti.

The waste management technologies have been additionally assessed to identify the preferred set of solutions in order to ensure the achievement of envisaged levels of waste management regarding the:

- Collection;
- Transfer and transportation;
- Recycling;
- Composting;
- Adequate treatment of special waste flows;
- Sanitary storage.

Special attention is paid to the achievement of waste management objectives that are listed in the Waste Management Strategy under a specific timetable as described in tables below. These targets have been developed in coordination with the national and local stakeholders and provide the grounds for planning waste management. The extent to which the targets will be achieved will depend on a number of factors, including actions related to the development of legislation and regulatory framework, awareness raising and communication, enforcement of the extended producer responsibility principle, as well as other factors.

Table 7-1: Targets for municipal waste collection

Planning period	Targets on municipal waste collection
Short-term: 2013-2017	100% of urban areas and 75% of rural areas
Medium-term: 2018 - 2022	100% coverage of rural areas
Long-term: 2023 and beyond	100% coverage with collection

Table 7-2: Targets for composting and recycling

Planning period	Recycling targets for packing materials (glass/PET/paper)	Biodegradable fraction of waste (garden waste, vegetables, kitchen waste)
Short-term: 2013-2017	15% (rural areas) and 25% (urban areas) recycled	Pilot projects that are to be developed/implemented to demonstrate the most efficient measures
Medium-term: 2018 - 2022	25-35% (rural - urban) recycled	50-40% (rural - urban) recovered
Long-term: 2023 and beyond	35-45% (rural - urban) recycled	100% - 100% (rural - urban) discharged from the landfill for recovery

Table 7-3: Targets for treatment of special, gross and construction waste

Planning period	Flow of hazardous domestic waste: batteries, accumulators, tires, pesticides, used oils, bulbs	Construction and demolition waste; Gross waste; WEEE
Short-term: 2013-2017	Special treatment according to the legal provisions. The separation collection must start in the short term when national solutions are developed.	40% adequately treated
Medium-term: 2018 - 2022		55% adequately treated
Long-term: 2023 and beyond		70% adequately treated

Table 7-4: Waste disposal, rehabilitation of landfills and waste transfer

Planning period	Transfer, sanitary landfill, closure of old landfills
Short-term: 2013-2017	Development of stations for transferring waste in micro-zones; Reduction of waste disposal places to 1-3 per rayon; Beginning of rehabilitation of the old landfills
Medium-term: 2018 - 2022	Reduction of the total number of storage places to maximum 1 landfill per waste management area, closure/rehabilitation of the remaining disposal places
Long-term: 2023 and beyond	Disposal of waste from the equipment for treating and recovering resources to a landfill per waste management area

7.1 Collection

The project of a waste collection system depends on the waste collection frequency, density of waste and number of containers available for waste storage between the collection stages. These criteria are valid for waste storage between the collection stages. However, the storage criteria vary between urban and rural areas.

7.1.1 Urban areas

For urban areas, it is recommended to apply the collection based on two containers – for the separate collection of moist and dry fractions of waste. In addition, the existing system for collecting PET bottles and other plastic items in containers made of wire net will be used until the end of its service time.

The frequency of collection in urban areas has been established at once per day for high blocks and once per week for individual houses, according to practices of developed countries. Table 7-5 identifies other technical criteria that are relevant for the projection of waste collection systems.

Table 7-5: Parameters for waste collection – urban areas

Collection trucks for urban areas	[m ³]	16
Density of waste in collection trucks	[ton/m ³]	0.600
Containers for blocks	[m ³]	1,100
Containers for individual houses	[m ³]	0.240
Density of dry waste in containers	[ton/m ³]	0.075
Density of moist waste	[ton/m ³]	0.225

7.1.2 Rural areas

In rural areas, mixed waste will be collected from common bins with the volume of 1.10 m³. The collection frequency has been set at twice per week. In addition, containers made of wire nets with the capacity of 4 m³ will be located for the separate collection of

PET bottles and plastic. The separate collection of paper is considered unfeasible, because paper is used as fuel and the separate collection of metal is also unfeasible, because this material reaches the recycling chain via various private collection agents.

Table 7-6: Parameters for waste collection – rural areas

Collection trucks for rural areas	[m ³]	10
Density of waste in collection trucks	[ton/m ³]	0.60
Containers	[m ³]	1.10
Density of waste in containers	[ton/m ³]	0.15

Waste will be collected by “micro-zones”. Each micro-zone will be defined according to the communities serviced by a transfer station (see below). This type of organization will ensure the efficient maximum use of the collection equipment.

7.1.3 Requirements for the waste collection equipment

On the basis of the above mentioned projection parameters and criteria, Table 7-7 specifies the necessary equipment that must comply with the waste collection requirements in the DRC. These requirements are based on waste collection from 100% of the population in 2013, while the investments will be divided in stages, according to the terms of fulfillment.

Table 7-7: Requirements for waste collection – DRC

	Overall requirements		Urban areas			Rural areas		
	Urban	Rural	Area 1	Area 2	Area 3	Area 1	Area 2	Area 3
Containers: 1.10 m ³	1,700	11,700	600	600	500	5,900	2,600	3,200
Containers: 0.24 m ³	94,600	-	32,800	33,000	28,800	-	-	-
Collection trucks	5	14	5	0	0	7	3	4

The table above indicates the overall requirements for waste collection equipment. Some of this already exists. The existing equipment will be gradually replaced and will be linked with the need for detailed requirements for equipment.

7.2 Transfer and transportation

In case of long distances, the transfer stations and long-distance transportation to the dumpsites have the capacity to reduce the costs as compared with the transportation by waste collection vehicles.

The transfer stations will be equipped with an access ramp that will enable unloading the waste, a concrete platform and roof. All the transfer stations will be equipped with the same type of containers. The size of the transfer stations depends on the volume of waste they will receive. The large transfer stations near the cities will operate under a schedule in two shifts per day and will also serve as installations for selecting fractions of dry waste for the recovery of recyclable materials. Table 7-8 describes the necessary equipment for large transfer stations.

Table 7-8: Requirements regarding the transfer/waste selection stations

Item	No. of units
Concrete platform with storage place with roof	1
Ramp construction	1
Fence	1

Container for small/public office	1
Small container for hazardous domestic waste	3
Container for gross waste	2
Industrial scales	1
Weighbridge	1
Selection assembly line	1
Waste baling press	2
Lift	1

The rural areas will be serviced by smaller transfer stations that will operate in one shift per day or less. Table 7-9 defines the needs of equipment that are typical of transfer stations from rural areas.

Table 7-9: Requirements for equipment in rural transfer stations

Item	No. of units
Concrete platform with storage place with roof	1
Ramp construction	1
Fence	1
Container for small/public office	1
Small container for hazardous domestic waste	3
Container for gross waste	2
Container for recycle waste	2
Hydraulic press	1

The parameters for projecting the long-distance waste transportation are presented in table 7-10.

Table 7-10: Technical parameters for long-distance transportation

Capacity of long-distance vehicles + trailer	[m ³]	60
Density of waste in long-distance vehicles	[ton/m ³]	0,30
Containers	[m ³]	30

The long-distance transportation implies the existence of a sanitary landfill at the destination, the location of which is mentioned in table 6-3. The sanitary landfills from these places represent the optimal location from the time and distance perspective. However, the selection of any area for locating the sanitary landfill must comply with the environmental impact assessment procedures and the final decisions on the location of sanitary landfills will be taken after the completion of these procedures. On the basis of these statements, the table below presents data on the equipment required for the transfer and long-distance transportation. At this stage, the volume of waste calculated for recycling and treatment that is deducted from the generated waste was taken into consideration.

Table 7-11 refers to the equipment for waste intended to be disposed through burial.

Table 7-11: Requirements for the transfer station and long-distance transportation

Item	Area no. 1 of waste management	Area no. 2 of waste management	Area no. 3 of waste management
Long-distance trucks	5	2	2
Containers of m ³	96	40	40
Transfer stations	11	4	6
Tons/year	44,800	18,400	18,600

7.3 Recycling

In order to achieve the above indicators, it is planned to separately collect the waste flows in line with the EU best practices. Additional equipment is required to sort, press and bale the recycle waste selected from trash ramps.

The waste transfer/selection stations of urban areas where separately collected waste is brought (namely: dry and moist fractions) will be equipped with a small industrial shed and an assembly line that enables the selection of dry waste. These transfer and selection stations will be equipped with hydraulic press for pressing and baling the plastic, paper, non-ferrous metals, etc.

The transfer stations from rural areas will be equipped with a small hydraulic press to press the plastic and a concrete platform with roof to store these materials until their transportation to the market. The selection and baling processes will result in recyclable products with market value and a certain percentage of refusal. For the beginning, an efficiency rate of 50% of the system of segregation and selection from the generator and the baling installation is estimated.

Table 7-12 summarizes the quantities of recyclable materials that need to be covered.

Table 7-12: Quantity of expected recyclable materials

	Urban areas [ton]			Rural areas [ton]		
	Area 1	Area 2	Area 3	Area 1	Area 2	Area 3
Material	1,000	1,000	900	1,700	800	900
Plastic	1,200	1,200	1,000	1,900	800	1,000
Paper and carton	1,300	1,300	1,200	2,200	1,000	1,200
Glass	400	400	300	600	300	300

7.4 Composting

Composting in rural areas will take place by sun drying of vegetal waste from parks and public green spaces. The technology includes unloading vegetal waste on a special area and arranging it in stripes in the form of pyramidal section. The material must be regularly tedded for aeration. This procedure can be more efficient if it is conducted with the help of a mobile composting installation used on several composting zones. It is necessary to carry out regular tests to measure the temperature and humidity of the composted material.

This type of composting usually lasts 2 to 6 months and, due to the significant loss of water, the material becomes by about 50% lighter. Composting can be conducted throughout the year. However, the process is usually slower in winter, and the vegetal waste required to fuel the system is not generated in large quantities in winter and can be stored until spring.

To produce a qualitative product that will be used for agricultural purposes, it is important to make sure that only vegetal waste will be composted. As a result of using other organic materials, contamination agents can penetrate and reduce the potential of using the compost.

For urban areas, it is recommended to build a composting platform for every city. On the basis of the volume of vegetal waste generated in cities, one composting equipment will be allocated for every Region. The equipment will include a crusher, a tedding device and a separator that will have the production capacity of 40 tons per day.

In rural areas, a composting platform will be built at about 1 - 0.50 km away from each village to treat animal and agricultural waste, such as straw that currently reaches the

municipal waste flow. The platforms are to be built of concrete or impermeable material. These spaces require equipment with the daily capacity of 50 tons and above, given the estimated quantities of waste. The equipment must contain a mobile device for tedding sun dried vegetal waste and a frontal loader. No crusher and separator will be required, because these composting stations do not treat a large volume of materials. The requirements for the equipment are specified in Table 7-13. The parameters of the composting installation are mentioned in Table 7-14.

Table 7-13: Requirements for the equipment of the composting installation

Item	Number of units at the composting station in urban areas	Number of units at the composting station in rural areas
Concrete platform	1	1
Sieve	1	0
Mobile crusher	1	0
Mobile tedding device	1	1
Storage basin	1	1
Unit for forced drying through intensive ventilation	1	1

Table 7-14: Quantity of waste that is to be composted and the capacity of the CU

Type of item	Region Centre		Urban area			Rural area		
	Urban area	Rural area	Area 1	Area 2	Area 3	Area 1	Area 2	Area 3
Ton/year	6,100	78,500	2,100	2,100	1,900	39,700	17,500	21,300
Composter with the capacity of 40 tons/day	1		1	-	-	-		
Composter with the capacity above 50 tons/day	-	6	-	-	-	3	1	2

7.5 Adequate treatment of special waste flows

Some types of waste need to be managed in parallel with municipal waste, because their large volume requires special measures and equipment to ensure their correct management and/or because they have hazardous properties for public health and for the environment. They include construction and demolition waste, hazardous domestic waste, as well as waste electrical and electronic equipment (WEEE), used tires, used oils and used accumulators/batteries.

7.5.1 Construction and demolition waste

Table 7-13 presents the quantities of waste generated by constructions and demolitions. This type of waste reaches the public bins in most cases. This is a heavy material that increases the collection costs, can damage the waste collection equipment and is not foreseen in the municipal waste collection costs. The collection of this type of waste can be performed on the basis of a phone call when the users call a specialized service and order a container for inert waste when they need it. When a construction or demolition authorization is required, the authorization applicant can be solicited, as an alternative method, to manage the construction and demolition waste through the specified methods (e.g. provision of special containers and transportation of waste to an area arranged for treating and evacuating waste).

Table 7-15: Quantities of construction and demolition waste

Material	Urban areas [tons]			Rural areas [tons]		
	Area 1	Area 2	Area 3	Area 1	Area 2	Area 3
Construction and demolition waste	3,000	3,000	2,600	8,700	3,800	4,700

A large part of construction and demolition waste is recyclable, another part is inert, while the third part is hazardous waste. The adequate treatment of this waste requires the separation of hazardous waste flows, while the rest of waste must be stored in areas of evacuation of the inert waste. These areas are similar to the landfills, but their construction and operation is cheaper, because the potential danger for the environment is low and, consequently, less environment protection measures are required. The equipment for treating construction and demolition waste is specified in table 7-16.

The excavated soil can be reused for a number of purposes that include the rehabilitation of polluted land. Beside other advantages, it can be used as a start of coverage for waste storage areas. The recycling of concrete and gross construction waste can be performed after it is sieved, which produces different products that can be reused in construction. The treatment of construction and demolition waste can be performed in a special place within a waste storage area.

Table 7-16: Specific unit for recycling construction and demolition waste

Mobile equipment	Units
Wheeled loader	1
Beaker for waste demolition	2
Excavator	1
Hydraulic hammer for the excavator	1
Sieves	1
Bin for the office	1
Spare parts container/Containers for hazardous waste	1
Mobile station for fuel distribution	1

7.5.2 Flow of hazardous domestic waste

The flow of hazardous domestic waste includes oils, batteries, bulbs, pharmaceutical products and other domestic products and waste whose chemical or physical properties endanger the public health and the environment. The management of this waste requires the development of solutions at national level. However, the transfer stations and the waste storage areas might serve as places for the temporary storage of these flows of waste in case they are adequately equipped. A large share of this waste can be treated for recycling, while other waste requires special treatment to make it non-hazardous before evacuation.

7.5.3 Waste electrical and electronic equipment (WEEE)

WEEE is a flow of complex waste that contains recyclable materials, as well as hazardous materials. The collection of these flows of waste can be conducted via local and national campaigns. The transfer stations and the evacuation areas might be used as places for the temporary storage of this type of waste in case they are adequately equipped. Before recycling, it is necessary to disassemble the WEEE in several parts if this is possible. This procedure is easier to be carried out at regional or national level, in special treatment installations that meet the sanitary and safety requirements of the EU.

7.5.4 Used tires, used oils and used accumulators/batteries

All these materials will be managed separately one from another and separately from other waste.

The actions for the management of used oils and tires, accumulators and batteries will have to be developed in parallel with the enforcement of the extended producer responsibility that applies to the units in the private sector in charge for these categories of waste. The actions will also include provisions for the safe collection of waste, provisions on the facilities of storage in the community where waste generators can evacuate this waste for free, as well as actions that ensure that this waste is not contaminated with other materials and the planned collection of this waste from storage places is conducted by qualified and trained personnel using adequate trucks and vehicles for duly regulated treatment – preferable at recycling installations.

7.6 Waste transportation to the landfill

A landfill will service the waste management areas from the Centre Region. As mentioned above, the waste will be brought to the landfill of the transfer stations by long-distance vehicles, except for the fact that the waste from communities that are not located near the landfill will be transported directly to the landfill without being transported first to the transfer station.

The modern landfills are built and exploited so as to protect public health and the environment from the negative impact of waste. In this sense, there are three major considerations:

- It is necessary to collect and treat the leachate in special installations. The leachate is a liquid that results from the decomposition of waste. The created quantity of leachate depends on the quantity of degradable waste at the landfill and the volume of water that reaches this area from rains, snow or underground water. The landfills are designed, built and operated so as to reduce the volume of water that penetrates the landfill, prevent the uncontrolled leakages of leachate from landfills, collect the leachate and serve for the treatment of the leachate;
- It is necessary to collect and treat the gas generated by landfills. The waste gas is also a product generated from waste degradation at the landfill. It represents a mixture of a number of gases, the most of which being the methane – one of the largest generators of the greenhouse effect. The control over the gas of landfills is carried through its collection in pipelines and treatment through burning; as an alternative method – if there is a sufficient quantity of gas – it can be used to generate power;
- It is necessary to ensure the control over the small generated by waste, the rodents/insects and the dust. The small generated by waste is caused by its degradation. It is not only unpleasant, but also attracts the rodents and insects bearing infections. Consequently, the waste must be regularly covered with soil or similar material to prevent the spread of smell. It is also necessary to control the dust emissions, especially, along the ways of access by periodically spraying water.

To ensure the efficient management of the waste storage places, the sanitary landfill that services every management area in the DRC must be designed and built in line with the EU standards. The design and construction of a sanitary landfill implies the following works and a certain infrastructure: preparing and obturating the foundation, installing the drainage system, building a surrounding embankment, the installation for collecting and treating the leachate, fence and gate; installations for monitoring the

quality of underground water; additional infrastructure for storage of the installations, offices, maintenance and access.

The landfills are designed for extended periods as “cells” that will comply with the requirements for storage in the area where they are located. At the beginning, the foundation is obturated, the key infrastructure and the first 2 storage cells are built. Each cell will store waste for 3-7 years, depending on the structure of the landfill; then, the cell is closed down and another adjacent cell is commissioned. It is allowed to build one cell over another to extend the volume of waste that can be stored on a certain area. This is how the ongoing development of landfills takes place throughout their exploitation. The landfill is designed to receive waste during 25 years.

According to the preliminary calculations based on the technical-financial analysis of the terms for access to the road network in the DRC, preferred locations for sanitary landfills are suggested as follows: Area no. 1 – near the Merenii Noi or Bubuieci villages; Area no. 2 – near Ungheni city and Sipoteni village; and Area no. 3 – near Mitoc village or Soldanesti city. In addition, the locations for sanitary landfills will be selected in line with the legislation on environmental impact assessment and other regulations on environment protection that stipulate or not the possibility to locate landfills there.

Table 7-17: Identification of typical items required for a modern landfill

Landfill items
Preparing the location, buildings, roads and infrastructure
Cleaning and grubbing the land
Building (container) to control and weigh the waste
Building to receive waste
Weighbridge
Road, platform and access infrastructure
Fence
Water supply (spring, pipelines)
Power supply (cables)
Internal power supply
Workshop / garage
Area for wheel washing
Piezometers / surveillance shafts
Indicators
Field works
Excavating the surface soil, designing and building barrages
Excavating and obturating the basin for the leachate
Excavating and preparing the surface of the water basin
Foundation obturation system
Casting and compacting a layer of mineral seal
Geo-membrane
Drainage layer
Geo-textile protective layer
Protective layer
Specific obturation system with plastic casing
Control over the leachate
Sump holes covered with caps, including field works
Perforated and non-perforated pipeline
Pumps for the leachate
Non-perforated central drainage pipeline

Control over the leachate
Leachate treatment
Supply pump
High pressure pump of the first stage
Circulation pump of the first stage
High pressure pump of the 2ST stage
High pressure pump of the 3ST stage
Inhibitor of dosing pump
Mixing pump (CIP)
Electrical control board
Compressed air station
Heating
Air conditioning
Ventilation
Drainage of surface water
Ditches (unpaved, with a layer of gravel at the base)
Gas collection
Gas ventilation duct
Collection pipelines
Gas supply station
Central collection pipelines
Restorative burning installation
Gas compression station
Mobile equipment for the landfill
Steel compactor with wheels
Dumper
Loader
Pick-up truck
Water tank

7.7 The potential of the mechanic-biological treatment method (MBT)

MBT is a widely used technology in some EU countries, especially, the western ones. However, the capital and investment costs are high as compared with the storage costs and the MBT markets are not safe. The use only of the MBT method for the separation of mixed waste for recycling results in the low quality of the recyclable material that requires additional treatment before finding a market for it. MBT used for the production of refuse-derived fuel (RDF) is most efficient when the caloric value of waste is high, but this is not the case of Moldova. In order to treat the waste before disposal at the landfill, the MBT has been largely implemented in the EU countries through the pressures resulted from the regulation process to reduce the volume of biodegradable material envisaged to be disposed at the landfills.

The use of MBT of waste before disposal has been implemented in other countries as well (often with donor support). As in other cases, the MBT costs are dependent on specific technologies that are selected.

The pilot project planned to be developed in Soldanesti needs to be independently monitored and evaluated, and the lessons learned must be applied in another part of the country, where applicable.

An MBT facility has already been funded and built by a private investor for the waste generated in the management process in Chisinau and, eventually, the Centre region.

However, this facility has been built in the absence of a commitment to deliver waste to it and, at the moment of development of this document, it is understood that the installation does not have contracts to receive or treat waste. Consequently, the MBT is recommended for further implementation in the DRC in the long term when the basic system for regional waste management is commissioned.

7.8 Closure of the old areas for waste evacuation

The essence of requirements for the closure of old waste storage areas is presented in Table 7-18. The closure of old areas for waste evacuation is important to stop the potential harm it causes to the environment through the toxic emissions in the atmosphere and the leachate waters that flow into the soil, the underground and freshwater systems. The areas for waste storage are not adequately closed and tend to generate methane that can cause fires or explosions.

The adequate closure of the areas for waste storage implies their reorganization to ensure their stability and coverage with several layers to ensure the impermeability and drainage and, finally, the plantation of vegetation on the rehabilitated place. It is very important to have informative boards installed at the closed landfill to provide clear information to the population regarding the location of the new landfill and of the transfer station, where applicable.

The ecologic inspections will need to take measures to react with regard to the persons who continue evacuating waste to the landfills that have been closed down.

Table 7-18: Elements required for the closure of the existing evacuation areas

Closure of the old evacuation areas	
•	Item
•	System for surface obturation
•	Restoration of the landfill
•	Layer of leveling/compensation
•	Clay layer
•	Drainage layer
•	Rehabilitation layer/soil
•	Planting vegetation
•	Gas ventilation duct

8 Requirements for the shift to the new system

The regional system for waste management that has been recommended to the DRC will be procured in time, gradually and progressively. Three factors must be mentioned in this regard:

- Use of current investments;
- Management of the existing contracts;
- Availability of the funds.

8.1 Use of current investments

Many local public authorities have made significant investments in various aspects of infrastructure and equipment management. In some cases, these investments are allocated for waste storage and collection, in other cases they are allocated for treating or processing the waste and in other cases – for waste evacuation. These investments should continue to be used by the local public authorities that allocated them as follows:

- Equipment for waste storage and collection. This equipment must continue to be used as planned by the LPA in line with the current legislation, until it needs to be changed. After replacing the equipment and making the regional system for waste management operational, the LPA will connect to this waste storage system and the procurement procedure will follow in compliance with the regional system;
- The equipment and installation for waste treatment and processing. These installations and equipment must continue to be used as planned by the LPA, in line with the current legislation, until they need to be replaced. After replacing the equipment and making the regional system for waste management operational, the LPA will connect to this system of waste storage and will follow the procurement procedure in line with the regional system. The waste treatment and processing equipment that is currently operating in the LPA must follow the regional procedure for waste treatment and processing. In this case, the equipment can be maintained as a necessary component of the regional system for waste management;
- Waste disposal installations. The number of waste disposal installations must be reduced to 1-3 landfills for each rayon before 2018. Starting with 2018, the number of locations for waste storage will be reduced to one sanitary landfill in each area of waste management (overall 3 for the Centre region), except for waste storage locations that have been built in line with the legislation on environment protection that meet the requirements mentioned in the typical technological scheme of solid domestic landfills approved by Order no. 67 of the Ministry of Environment and Territory Development in 2001. The closure of these locations will be coordinated with the CPA in parallel with the opening of sanitary landfills. All the landfills that will be closed down will need rehabilitation;
- The 1-3 waste disposal installations that will be appointed for every rayon as improved transition locations for waste storage (ITLWS) will operate until the construction of a sanitary landfill in the management area. These locations will be organized and will operate so as to reduce the impact of the stored waste on the environment. All the locations that are identified as ITLWS will have to meet the

requirements stipulated in the typical technological scheme of solid domestic landfills approved by Order no. 67 of the Ministry of Environment and Territory Development or to apply a mechanic-biological treatment of waste (see below) to stabilize organic waste and, therefore, reduce the negative impact of waste on the environment in the storage area. The identification and operation of these ITLWS locations will represent a temporary measure that does not divert the attention from the need to develop modern waste disposal facilities in line with the EU requirements;

- The mechanic-biological treatment (MBT) of waste before disposal can be an efficient approach to minimize the impact on the environment of waste that must be disposed in improved transition locations for waste storage. The development of an MBT pilot project in every community for the ITLWS operation will demonstrate the technical and financial need, as well as the feasibility of this technology, while the outcomes and lessons learned in this pilot project will be disseminated and applied in other communities;
- Investments in installations and new infrastructure for waste management. After the approval of the regional plan for waste management, all the investments in this field will need to be explicitly correlated with the requirements for installations and equipment of the regional waste management system.

8.2 Management of the existing contracts

The existing contracts on the waste management represent broad contracts on the delivery of waste collection and disposal services. The existing contracts will shift to the existing waste management systems as follows:

- Some existing contracts will reach the termination term before the waste management system is operational. In this case, the LPA may decide not to renew such contracts, but to extend their duration until the date when the regional waste management system becomes operational. In this sense, new provisions will be introduced according to which waste will be collected within the micro-zones;
- Some LPAs might simply terminate an existing contract when the regional waste management system becomes operational and agree on other terms and conditions of waste collection;
- Some LPAs might not have the flexibility to terminate contracts in which case they might redirect the contractor so that waste is no longer transported to the waste disposal area, but is transported to the transfer station or directly to the sanitary landfill if this is less expensive. In such cases, an additional payment might be necessary to compensate the contractor that will have to transport the waste to a longer distance than before;
- In some cases, the LPAs have concession contracts. In such cases, the LPAs might be required to deliver waste to the installations owned by a private entity. Thus, the LPAs might continue fulfilling the concession contract to process and/or treat the waste and both the LPA and the private entity (if appropriate) will be able to use the sanitary landfill to evacuate waste;
- If the LPAs decide to terminate the concession contract, they will take part in the entire regional waste processing/treatment process. The preliminary information demonstrates that most concession contracts have been signed by the LPAs without taking account of the public interest. Thus, the LPAs might have multiple possibilities to cancel these contracts.

While the public administration authority for environmental protection develops requirements according to the EU standards to build and design waste management installations, the grantees will be required to follow these requirements, but the higher standards might imply costs that they will not be able to cover according to the existing cession contracts. In this case, the LPAs might renegotiate the concession contracts or give up fulfilling these provisions if they do not want to pay additional fees.

It is envisaged that the local public administration authority for environmental protection will develop the regulatory framework for calculating the tariffs in which case the impact on fees imposed by the operators of cession contracts will be negative. However, there might be specific opportunities for the LPAs, namely to withdraw from an existing contract and shift to the regional waste management system.

8.3 Funding availability

The implementation of the regional waste management system in the DRC falls under the incidence of the funding availability, which falls under the incidence of priorities set out in the policies and strategies in this field approved by the Moldovan Government and of the funding availability from international and/or internal sources.

It is necessary to conclude funding agreements on the basis of implementation of regional waste management for the entire area of waste management or for both management areas in the DRC. This approach will maximize the efficiency of the investment and will ensure the coordination during the shift from the current provisions on waste management in each LPA to the regional waste management system.

Annex 4: Financial analysis

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1 Current situation

The waste management activities are currently financed by the state and the local budgets and subsidies on the one hand and by tariffs on the other hand. Although the draft law on waste includes provisions on extending producer responsibility (according to which producers and importers shall contribute to the costs of management of their own products when they become waste), it is not implemented and currently does not contribute to accumulation of financial resources to be used for providing waste management services.

As a contribution to developing the financial analysis, the information received from Regional Development Agencies and rayons has been used for estimating the current costs and the budget for waste management. If the information was insufficient, proposals were made based on benchmarks and expert estimations, for the purpose of completing the analysis.

1.1 Current costs

To assess the current costs, the information on the inventory stock, expenditures and revenues of the operators for the period 2009 - 2012 was used. Based on these data, the table below presents the typical pay scales in the current waste management system.

Table 1-1: Pay scales in 2012 and estimations for 2013

Pay scale	Gross salary/person/month, in Euro	
	2012	2013
Production process	178	187
Office employees	288	303
Management team	398	418

To estimate the salaries for 2013, a 5% increase to salaries in 2012 was considered. In addition to these figures, the operator pays 30% of gross salaries for social and health insurance.

To estimate the price for fuel and public services, market prices have been used.

Table 1-2: Unit price for fuel and public services

Item	Unit	Euro
Fuel (diesel)	litter	1.03
Electricity	kWh	0.11
Water	m ³	1.52

1.2 Assumptions

Because of insufficiency of data and given that currently the activities are limited to collection and storage, the following benchmarks were applied in calculating the maintenance costs, the wear and other operating costs:

Table 1-3: Benchmarks applied for estimating maintenance costs

Maintenance costs as % of the investment cost or the accounting value	%
Equipment produced abroad	12%
Equipment produced on the local market/easily reparable	2%

Maintenance costs as % of the investment cost or the accounting value	%
Buildings	5%

To calculate the costs of wear and replacement, the typical duration of operation of various equipment and assets was established.

Table 1-4: Duration of operation of equipment and assets

Specific duration of operation of equipment and assets	Years
Small bin for personal use	15
Bins for use in multi-flat buildings (1.10 m ³)	10
Large bins (30 m ³)	7
New collection trucks	12
Last generation trucks	12
Mobile interior equipment	15
Office bin and similar assets	10
Similar buildings and assets	20

Typical industrial prices were used for estimation of investment costs. For some equipment it was possible to check the prices, as some operators purchased this equipment (collection trucks, excavators and compressors) recently.

2 Investment costs

Investments are planned to be made according to the specific project timeline and according to the technical solution, designed to ensure reaching the desired level of service delivery. It is expected that the proposed short-term technical solution will be applied fully by 2018.

The table below presents an outline of investment costs in the new waste management system, required in order to fulfill the technical solution:

Table 2-1: Total (estimated) investment costs (2013, thousand Euro)

	Waste management zone no.1	Waste management zone no. 2	Waste management zone no. 3
Total investment costs in the new system	13,204	8,741	9,305

2.1 Investments in collection

For urban areas the investments will be used for equipment (bins and containers). Garbage trucks with compacting device will be required for waste collection

Table 2-2: Unit price for estimating investments in waste collection (2013, Euro)

Item	Type	Price
Bins	0.24 m ³	60
Bins for use in multi-flat buildings	1.10 m ³	430
Garbage truck with compacting device	10 m ³	80,000
Garbage truck with compacting device	16 m ³	90,000

To estimate the necessary investments, the recently purchased collection trucks were taken into account. Therefore, in some places the investment costs for this item are smaller or equal to zero. On the other hand, waste collection is inexistent in rural areas, and the investments reflect the cost of all equipment required in order to serve these zones in a proportion of 75% by 2018.

Table 2-3: Investments in waste collection in urban areas (2013, thousand Euro)

Waste Collection In urban areas	Type	DRC		
		Waste management zone no.1	Waste management zone no.2	Waste management zone no.3
Bins	0.24 m ³	1,968	1,980	1,728
Containers	1.10 m ³	258	258	215
Waste collection trucks	16 m ³	450	-	-
Total		2,676	2,238	1,943

Table 2-4: Investments in waste collection in rural areas (2013, thousand Euro)

Waste Collection In rural areas	Type	RDC		
		Waste management zone no.1	Waste management zone no.2	Waste management zone no.3
Containers	1.10 m ³	2,537	1,118	1,376
Waste collection trucks	10 m ³	560	240	320
Total		3,097	1,358	1,696

2.2 Investments in transfer and transportation system

A solution proposed for rural and urban areas is transfer station, as part of the transfer and transportation system. The waste will be transported to transfer stations in long-distance vehicles.

Table 2-5: Investments in transfer and transportation system (2013, thousand Euro)

Item	Type	Price
Large bins	30 m ³	1.50
Trailer truck for long distances	30 m ³ + 30 m ³	125

The transfer stations in rural and urban areas will have different sizes. Below we present the tentative prices for a typical transfer zone for rural and urban areas.

Table 2-6: Investment costs for a typical transfer station (2013, thousand Euro)

Item	Type	Price
Concrete polygon with covered storage	5	15
Ramp construction	25	35
Fence	2	5
Small office/public bin	10	10
Small bin for hazardous manure	0.45	2.10
Bin for gross waste	0.30	4
Covered storage facility	0	10
Bin for recyclable waste	0.4	0
Total	43	81

Based on these data, the value of investments in the transfer and transportation system was estimated, for rural and urban areas.

Table 2-7: Investments for transfer stations in Development Region Centre (2013, thousand Euro)

Item	Type	DRC		
		Waste management zone no.1	Waste management zone no.2	Waste management zone no.3
Transfer in rural areas				
Transfer station	rural	258	86	129
Bins	30 m ³	39	12	18
Transfer in urban areas				
Transfer station	urban	405	162	243
Bins	30 m ³	105	48	43
Transportation				
Long-distance vehicles	60 m ³	625	250	250
Total		1,433	558	684

2.3 Investments in resource recovery

Regarding resource recovery, investments for introduction of classification lines in transfer stations are planned, to be equipped with baling and compressing units.

Table 2-8: Investment costs for classification (2013, thousand Euro)

Equipment	Price
Technical balance	3

Weighbridge	25
Classification streams	17
Baling compressor	10
Lift	25
Total	80

Investment costs for recycling are based on the separate collection of waste (included in section 2.1.1.) provided that, for the entire urban area, the idea of collecting based on two differentiated bins for dry and wet waste sorted at source will be fostered. The table below shows the investment cost estimation for a simple waste sorting facility to be located in the industrial area of urban transfer stations.

Table 2-9: Total investment costs for classification and processing of waste (2013, thousand Euro)

	DRC		
	Waste management zone no.1	Waste management zone no.2	Waste management zone no.3
Classification and processing	215	86	129

The composting will be performed by mobile equipment. For rural and urban areas there are several types of appropriate equipment, the unit price of which is presented in the table below. In addition to these prices, the expenditures for building corresponding platforms have been estimated.

Table 2-10: Investment costs for typical mobile composting (2013, thousand Euro)

Mobile equipment	Urban	Rural
Sieve	60	0
Mobile grinder	215	0
Mobile composter	350	280
Rural	625	280

The price of the composting equipment for rural and urban zones was calculated based on the number of equipment required in each waste management zone.

Table 2-11: Total investment costs for composting (2013, thousand Euro)

	DRC		
	Waste management zone no.1	Waste management zone no.2	Waste management zone no.3
Urban composting	208	208	208
Rural composting	840	280	560
Total	1,048	488	768

2.4 Investments in the processing of specific waste streams

The collection and processing of hazardous household waste streams and WEEE will be organized and financed under a national system. Therefore, they are not part of the regional investment plan and are not included in these budgets. However, for the beginning, several bins are provided for these waste streams in transfer stations, until the national systems are launched.

These waste streams will be collected and processed by specialized companies, and will be financed through the Extended Producer Responsibility systems.

For recycling inert waste investments in mobile recycling are planned, one for the entire region, with a capacity of 10,000 tons/year.

Table 2-12: Investment costs for processing/recycling of solid waste (2013, thousand Euro)

Item	Price
Excavation, leveling works [m ²]	10
Concrete platform [m ²]	17
Fence [m]	2.30
Tire loader	115
Trunk for demolition waste	6
Excavator	140
Hydraulic hammer for the excavator	7
Sieve	100
Office bin	10
Bin spare parts	10
Bins for hazardous waste	10
Mobile fuel distribution facility	12
Total investments	439

2.5 Investments in sanitary landfills

Sanitary landfills will be built for each waste management zone in the region, according to EU standards. The investments are estimated based on the tons of waste to be stored within the 25-years period, which is the duration of operation of these landfills. For each waste management zone detailed estimations of the capacity of landfills in the first 10 years of operation are made. At the same time, the capacity of cells to be created in the following 15 years is estimated. The estimations are made based on investment costs for each zone. Provided that the additional landfill cells will have a significant part of investments already made (connection infrastructure, offices, operating equipment etc.), it is estimated that the investment costs will account for 60% of the initial investment price/ton.

Table 2-13: Investment costs for the sanitary landfill (2013, thousand Euro)

Item	Waste management zone no. 1	Waste management zone no. 2	Waste management zone no. 3
Land preparation, Buildings. Roads, Infrastructure	632	585	625
Embankment	129	121	122
Main closure system	1,121	829	840
Leachate drainage	1,249	1,062	1,122
Surface water drainage	9	8	8
Collection of gases	387	355	357
Equipment for the landfill, mobile	645	555	555
For the first phase (10 years)	4,589	3,867	3,939
For the second phase (15 years)	3,798	3,190	3,257
Total investments	8,387	7,057	7,196

2.6 Investments in closure of dumpsites and sanitary landfills

Closure of the existing dumpsites is planned to take place at the same time with the opening of new landfills. In the meantime the dumpsites and the sanitary landfills must be gradually closed. It is expected that part of investment costs will be included in the tariffs, in the form of an investment fund.

According to estimations, the closure of the existing dumpsites will be, to a certain extent, less expensive, per square meter, compared to the planned closure of sanitary landfills. The rationale is that the necessary embankment works are less expensive for the existing dumpsites, which are small and relatively flat. Provided that the old dumpsites are not equipped with the main closure system, the investments in installing a higher cap will be sufficient to ensure the drainage of water, but this cap will not ensure the impermeability. A reasonable solution is sought for these dumpsites. An integral solution of provided for closing the sanitary landfill cells according to EU standards.

Table 2-14: Price per m² for closing landfills and waste polygons, Euro

Item		Sanitary landfill cell
Remodeling the sanitary landfill	1.40	3
Leveling/compensation layer	1	2
Clay layer	3	3
Drainage layer	0	2
Cultivation/soil layer	0.50	3
Planting	0	1.50
Ventilation hole (gas evacuation)	1	0
Total EURO/m²	6.90	14.50

It is expected that the closure of about 600 (DRN and DRC) of the existing dumpsites and of the sanitary landfill cells will happen gradually, within 10 years.

Table 2-15: Closing existing landfills and regional waste cells 2013, thousand Euro

	Waste management zone no. 1	Waste management zone no. 2	Waste management zone no. 3
Closure of old dumpsites	19,872	10,281	11,661
Closure of sanitary landfill cells: phase 1	556	411	417

2.7 Investment Plan

Investment planning for the establishment of the regional waste management system is carried out for each waste management zone, for the short-term planning period. Investments are planned in such manner that they follow the planning programs of projects envisaged for implementation in the following 10 years.

Most investments provided for under this planning are expected to be implemented in 2016 and 2017, in order to have an operational system in 2018.

Table 2-16: Investment plan (2013, thousand Euro)

DRC	Budget for the new	Pilot-project budget	2014	2015	2016	2017
Waste management zone no. 1						
Investments in the new system	13,204	1,538	513	1,025	3,889	7,778
Closure of old dumpsites	3,974	0	0	0	1,987	1,987
Total waste management zone no. 1	17,179	1,538	513	1,025	5,876	9,765
Waste management zone no. 2						
Investments in the new system	8,741	0	0	0	2,914	5,827
Closure of old dumpsites	2,056	0	0	0	1,028	1,028
Total waste management zone no. 2	10,797	0	0	0	3,942	6,855
Waste management zone no. 3						

Investments in the new system	9,305	0	0	0	3,102	6,203
Closure of old dumpsites	2,332	0	0	0	1,166	1,166
Total waste management zone no. 3	11,637	0	0	0	4,268	7,369

Note:

- Waste management zone no. 1: Hincesti, Ialoveni, Anenii Noi, Criuleni, Strasenii, Dubasari;
- Waste management zone no. 2: Calarasi, Ungheni, Nisporeni;
- Waste management zone no. 3: Rezina, Orhei, Soldanesti, Telenesti.

2.8 Technical assistance budget

Based on investment needs for physical infrastructure, the budgets necessary for technical assistance will be calculated. They will be calculated as a share of physical investments and will be planned according to the project schedule.

Table 2-17: Benchmarks for estimation of technical assistance

Item	% of the total amount of investment
Investments in the new system	100
Detailed design and planning	6
Bidding and contracting processes	1
Supervision of works	3
Institutional strengthening	1
Public awareness campaigns	1
Project audit	1

Table 2-18: Budget plan for technical assistance (2013, thousand Euro)

Waste management zone no.1		2014	2015	2016	2017	2018
Investments in the new system	13,204	0	0	0	0	0
Detailed design and planning	792	0	792	0	0	0
Bidding and contracting processes	132	0	132	0	0	0
Supervision of works	396	0	0	198	198	0
Institutional strengthening	132	0	0	44	44	44
Public awareness campaigns	132	0	0	44	44	44
Project audit	132	0	0	0	0	132
Total TA for Waste management zone no. 1	1,717	0	924	286	286	220
Waste management zone no.2						
Investments in the new system	8,741	0	0	0	0	0
Detailed design and planning	524	0	524	0	0	0
Bidding and contracting processes	87	0	87	0	0	0
Supervision of works	262	0	0	131	131	0
Institutional strengthening	87	0	0	29	29	29
Public awareness campaigns	87	0	0	29	29	29
Project audit	87	0	0	0	0	87
Total TA for Waste management zone no. 2	1,136	0	612	189	189	146
Waste management zone no.3						
Investments in the new system	9,305	0	0	0	0	0
Detailed design and planning	558	0	558	0	0	0
Bidding and contracting processes	93	0	93	0	0	0
Supervision of works	279	0	0	140	140	0

Institutional strengthening	93	0	0	31	31	31
Public awareness campaigns	93	0	0	31	31	31
Project audit	93	0	0	0	0	93
Total TA for Waste management zone no. 3	1,210	0	651	202	202	155

Note: The TA budgets presented above do not include feasibility studies and the environment assessment studies, which will be necessary before the agreement on implementation of regional waste management plan.

3 Operating costs

To obtain the operating costs, the costs per ton for a number of typical activities were calculated, and later applied to the tons of waste included in various activities in different waste management zones, in order to obtain the operating costs per waste management zone.

Table 3-1: Budget lines in addressing operating costs

Amortization
• For all assets
Human resources
• Manager
• Office employee
• Worker
• Protection equipment
• Social and health insurance
Overall expenditure
• Supply
• Communications
• Environmental authorization
Fuel
• Fuel
• Lubricants
Repair and maintenance
• For equipment produced abroad
• For equipment produced locally
• For buildings, field work
Utilities
• Water
• Electricity (including heating)

These budget lines allowed calculating the typical operating costs per ton for the items described below. Storage costs were an exception, as this is an activity specific for scale economies, for which the operating costs were calculated separately for each waste management zone. The table below presents a number of costs.

Table 3-2: Operating costs per ton (2013, Euro)

Item	Cost/ton
Cost for urban collection	
Cost for urban transportation	16.91
Collection costs, no transportation	6.94
Cost for rural collection	
Cost for rural transportation	17.88
Collection costs, no transportation	6.94
Cost for transportation, transfer station	
Rural transfer station	5.62
Urban transfer station	5.36
Long distance transportation	8.62
Resource recovery	
Recycling of dry materials	17.55
Urban composting	9.76
Rural composting	6.06

Processing of construction and demolition waste (C&D)	25.64
Operation of landfill	7 la 14

Using the costs per ton, it was possible to calculate the total operating costs for each waste management zone and for each activity.

Table 3-3: Operating costs per ton per activity (2013, thousand Euro)

	Waste management zone no. 1	Waste management zone no. 2	Waste management zone no. 3
Collection			
Cost for urban transportation	370	374	324
Collection costs, no transportation	152	152	133
Cost for rural transportation	567	248	305
Collection costs, no transportation	219	96	118
Total	1,308	870	880
Transfer stations and long-distance transportation			
Rural transfer	119	26	32
Urban transfer	181	85	75
Long distance transportation	449	166	161
Sub-total	749	277	268
Recycling and processing			
Recycling of dry materials	136	136	119
Urban collection of green waste	18	12	12
Urban composting	20	20	18
Rural composting	241	106	129
Processing of construction and demolition waste (C&D)	299	175	188
Total	714	449	466
Storage			
Operation of landfill	404	338	342
Total	404	338	342
Overall total	3,175	1,934	1,956

4 Non-tariff revenues

The revenues are calculated for the dry fraction of waste that has been sorted and compressed, for products obtained by recycling construction and demolition waste and by selling the compost.

It is estimated that in the first year of operation of the new system only 50% of light recyclable materials will get to dry bins. We assumed that the population will have access to infrastructure, but will not use it or will grade only some of the generated waste at the source. Subsequently, according to estimations, only 80 per cent of waste from this stream will be sorted for sale purposes, and 20% will become sterile waste.

For composting in rural areas we estimated that the share of manure and green waste will account for 60%, of which 2/3 will be sold as smaller finished product, because of water loss. As a significant part of green waste in urban areas is collected by operators, given that this activity concerns the public green space management service, we estimated a share of 80% for collection and 70% for the sale of the resulted material.

As regards the recycling, according to our estimations, a share of 40% - about 10,000 tons of inert waste will be collected and recycled. Usually, about 85% of inert waste are mineral fertilizers, the remaining waste is graded and turned into waste. It has been estimated that 80% of processed mineral waste will be issued for sale in the first year of operation at maximum capacity.

The rate of collection and sale can be gradually improved, once the awareness of the population increases, the EPR (Extended producer responsibility) principle is introduced and the market for these products is developed.

Table 4-1: Not-tariff revenues (2013, thousand Euro)

	Sale price			
By-product	Euro/ton	Waste management zone no. 1	Waste management zone no. 2	Waste management zone no. 3
Recyclable materials				
Paper and cardboard	31	30	30	25
Non-ferrous metals	400	25	25	19
Ferrous metals	100	25	25	19
Glass	30	31	31	28
Plastics	188	277	210	202
Compost				
Manure compost	5	83	36	44
High quality compost	8	9	9	8
Inert waste				
Inert waste products	10	31	18	19
Total revenues		514	387	367

5 Tariffs and affordability

The costs to be recovered from tariffs are calculated based on operating costs, including wear and replacement costs. Also, the cost of establishing a fund for closing landfills and for building new cells for landfills are added to the operating costs. Non-tariff revenues are not part of these costs (ex.: from sale of recyclable materials).

Table 5-1: Annual costs for calculation of tariffs (2013, thousand Euro)

	Waste management zone no. 1	Waste management zone no. 2	Waste management zone no. 3
New system operating and maintenance costs	3,176	1,935	1,957
Including costs related to payment of profit tax, property taxes and other taxes - 10%	3,493	2,128	2,153
Including reserve for closing sanitary landfills and opening new cells	3,929	2,488	2,520
Cost according to non-tariff revenues	3,414	2,101	2,153

To obtain macro-tariffs, the costs of financing needs must be taken into account. These can vary depending on the available funding scenario. Three different funding scenarios are considered - one with full financing from grant sources, another - with financing from a subsidized loan for 25 years, with an interest rate of 3% and the third scenario - financing from a loan obtained from a private bank for 25 years and with an interest rate of 9%. According to estimations, in all three scenarios imply the technical assistance will be financed from the state budget. No grace period for loans has been taken into account, in order to reach a conclusion on the impact of funding on tariffs in 2018.

The level of affordability is estimated at 1.2% of income per capita, according to international affordability benchmarks. To obtain operating costs and revenues relevant to the situation in 2018, an increase of 2.50% is expected in both the expenditure and revenues. This is in line with GDP growth, estimated in the projections of waste amount, based on the economic growth and the growth of the population number.

Table 5-2: Macro-tariffs and affordability (Euro, 2018)

Micro-tariffs per capita, per year	Grant funding	3% interest rate	9% interest rate
Waste management zone no. 1	7.75	10.08	11.03
Waste management zone no. 2	9.16	11.98	13.12
Waste management zone no. 3	8.36	11.05	12.16
% of income per capita			13.42
% of the budget spent for waste management, per capita, per year	%	%	%
Waste management zone no. 1	57.76	75.12	82.21
Waste management zone no. 2	68.28	89.24	97.80
Waste management zone no. 3	62.26	82.38	90.59

6 Cost recovery mechanisms

To have an affordable tariff scheme, that would ensure a 100% cost recovery, differentiated tariffs will be applied for individuals and legal entities. The basic principle is as follows: the people who have the possibility to pay more should indirectly subsidize the people who can afford smaller payments only. Thus, it was suggested that legal entities, including institutions and businesses, should pay a higher tariff compared to households. At the same time, households in urban areas will pay a higher tariff compared to those in the urban areas.

Based on a number of estimations, the tariffs may be established depending on the category of service beneficiary. Assuming that 10% of all generated waste come from institutions and legal entities and they will pay for generated waste 120% of the waste management costs, we manage to obtain a better approximation of the micro-tariff per capita, for citizens.

Table 6-1: Macro-tariff after revenue from legal entities (Euro, 2018)

Macro-tariffs	Euro/year/inhabitant		
	Grant funding	3% interest rate	9% interest rate
Waste management zone no. 1	6.82	8.87	9.71
Waste management zone no. 2	8.06	10.54	11.55
Waste management zone no. 3	7.35	9.73	10.70

If these macro-tariffs are applied to typical rural and urban households in Moldova, in a number of 3 employed¹, site accessed in May 2013) people per household, employed, based on the idea that urban households would indirectly subsidize the rural households at 20%, we will obtain differentiated urban and rural tariffs per household per month.

Table 6-2: Tariffs in urban and rural areas/household/month (Euro, 2018)

Tariffs/ household/ month	Urban			Rural		
	Grant funding	3% interest rate	9% interest rate	Grant funding	3% interest rate	9% interest rate
Waste management zone no. 1	2.01	2.62	2.86	1.62	2.11	2.31
Waste management zone no. 2	2.37	3.09	3.39	1.83	2.38	2.61
Waste management zone no. 3	2.16	2.86	3.14	1.87	2.44	2.67

To maximize the payment ratio, various payment collection and strengthening methods can be applied. One option would be introduction of a tariff for waste management in the same bill with those for payment of other utility services, e.g. water, an approach which is currently applied by some local public authorities (LPA I) in Moldova; the payment can be done to an administrative authority relevant for waste management or a utility entity that will transfer the payments for waste management services to the ad-

¹ National Bureau of Statistics of the Republic of Moldova, Households by the type of household, by areas, by regions <http://www.statistica.md/pageview.php?l=ro&id=2361&idc=295>

ministrative entity relevant for waste management, against an additional charge for such services. Other options can also be identified.

Another option would be collecting the payments by a public administrative entity, either through a special agent going door-to-door to collect the payments, or by establishing offices where payments can be done. In each of these cases, preference is given to administrative public entity, as operators do not have sufficient means to monitor payments, since they need to ensure the service continuity even in the event of non-payment of the fee, in order to prevent accumulation of waste, which would endanger the environment and human health. On the other hand, the administrative unit has more means of ensuring payments through administrative and fiscal measures.

Funding and additional revenue, according to estimates, will come from economic instruments, the most important of which is the principle of extended producer responsibility, as described in more detail in the institutional chapter of this report.

Annex 5: Plan of measures and activities for Waste Management RSP implementation

Tables

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Table 11: Plan of measures and activities for Waste Management RSP implementation

No.	Action	Timeframe	Responsible	Monitoring indicators
Overall objective: Developing a municipal waste management system in Development Region Centre by strengthening the legal, regulatory and institutional framework in line with EU standards, developing municipal waste management infrastructure, special waste streams, based on regional approach, public information and awareness.				
Specific objective 1: Strengthening the political, legal and regulatory framework				
1	Developing the Waste Management Strategy for Development Region Centre	2013-2014	MRDC, RDA	Strategy developed and approved
2	Completing and approving the law on waste	2013	ME	Law approved
3	Developing and approving standards (on storage, authorization, tracking, classification of waste, on the design, construction and operation of landfills) for the implementation of the Law on waste	2013 >	ME, MRDC	Number of standards developed and approved
4	Developing and implementing financial economic mechanisms (establishing taxes for collection and disposal of waste) on regional waste management system	2017	ME, MRDC, RDA, LPA	Number of approved legal documents
5	Developing mechanisms for implementation of "extended producer responsibility" principle for all waste streams, including the special waste (accumulators and batteries, waste tires, packages, waste electronic and electric equipment, discarded vehicles)	2014-2018	ME, RDA, LPA	Number of approved legal documents
Specific objective 2: Strengthening the regional level institutional framework for the management of the regional system and attracting investment;				
1	Establishing institutional arrangements for the management of a waste management system at the inter-raional level for DRC;	2014-2015	RDA, Raion councils, LPA	Number of established arrangements
2	Strengthening the institutional capacity of each LPA I in waste management	permanently	RDA, Raion councils, LPA, RAWM	Number of trained LPA I
3	Strengthening the institutional capacity of waste management companies at the local level	permanently	RDA, raion councils, LPA, RAWM	Number of trained companies

4	Establishing a system of collection, processing and analysis of waste management data at the regional level	2014-2015	RDA, LPA	Number of established systems
5	Developing a training program on the application of the new waste data reporting system, based on the new waste classification and record system	2014-2015	RDA, LPA	Number of training programs
6	Developing and implementing a training program on regional and local waste management, public awareness on application of the regional waste management system	2013-2014	RDA, LPA	Number of training programs
Specific objective 3: Developing waste management infrastructure at the regional level;				
1	Expanding waste collection, transportation and disposal services in urban localities to rural localities	2014-2018	RDA, LPA, RAWM	Number of expansions
2	Strengthening the capacity of the primary waste collection system	2013-2018	RDA, LPA	Number of bins, procured equipment
3	Creating networks for separate collection of green waste, manure	2016-2019	RDA, LPA	Number of networks/number of procured equipment
4	Developing a Plan for closing the existing manure dumpsites, which do not meet EU requirements	2014-2016	ME, RDA, LPA	Number of developed plans
5	Reducing the number of existing landfills to 1-3 landfills per raion	2017	ME, RDA, LPA	Number of reduced landfills
6	Selecting sites for placing regional infrastructure facilities (regional landfills, transfer stations)	2014 - 2015	RDA, LPA, SEI	Number of selected sites
7	Developing feasibility studies for establishing waste management infrastructure in each zone in the DRC	2014-2015	RDA, LPA	Number of developed studies
8	Developing concept designs for the construction of 3 sanitary landfills in DRC	2015-2016	RDA, LPA	Number of developed concept designs
9	Developing detailed concept designs for the construction of urban/rural transfer stations and treatment facilities	2015-2016	RDA, LPA	Number of developed concept designs
10	Construction of 3 regional landfills	2017	RDA, LPA	Number of built objects
11	Building transfer stations and waste treatment facilities	2017	RDA, LPA	Number of built objects

12	Procuring equipment	2017	RDA, LPA	Amount of procured equipment
Specific objective 4: Informing and raising public awareness of waste management at the regional level				
1	Developing public education and awareness programs on the new waste separate collection system: In rural areas - separate collection for PET and mixed collection In rural areas - separate collection on 2 fractions: humid fraction (kitchen waste, food waste) and dry fraction (glass, plastics, paper, cardboard, metal and other fractions)	2014-2017	ME, RDA, LPA	Number of developed programs
2	Developing public awareness programs on the "obligation to undertake extended producer responsibility" and the "polluter pays" principle	2016 - 2018	ME, RDA, LPA	Number of developed programs
3	Conducting public awareness campaigns on waste management in the regional context	2017-2018	RDA, LPA	Number of developed programs

Annex 6: Methodology for projects portfolio identification

Content

1 Methodology for projects portfolio identification 1

1 Methodology for projects portfolio identification

The project pipeline is developed based on the RSP. These projects will help achieve the overall and the specific objectives of the DRC.

The possible project concepts (PPCs) in the field of waste management in DRC will include system projects for each waste management zone. The criteria for identification of each PPC are in line with the criteria for identification of waste management areas. According to the regional approach, the waste management areas will be managed by all LPAs in these areas. The DRC has 3 areas identified for this region. Therefore, 3 system PPCs will be reviewed for the DRC.

Each PPC will include the entire waste management network, starting with transportation, transfer, burial of waste and its treatment for the waste management zone. All assessments and calculations for this system will be made at the stage of the FS, when the system PPC infrastructure elements are also established.

For the PPCs to become viable project concepts (VPC), sub-projects will be developed and will develop, in turn, projects for all the waste management infrastructure elements, including sanitary landfill, transfer stations, sorting recycling, composting, mechanical biological treatment and other facilities, as appropriate. In turn, for each infrastructure element, detailed project documentation will be developed, with all aspects of field location, connection to energy sources, water, sewage and other aspects coordinated with the supervising and the state control authorities.

LPAs in each management zone will be invited to review the approaches related to the identification methodology.

The RSWG will examine the list of “possible project concepts” and will submit relevant proposals.

The list of projects is expected to be submitted to RDC in January.