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## NATIONAL STRATEGY

for the Management of Municipal Solid  
Waste and Secondary Material Resources in the  
Republic of Belarus for the Period up to 2035

### CHAPTER 1 GENERAL PROVISIONS

The system of goals, objectives, principles, priorities and lines of operations that are to be implemented in legal acts, the acts of local government authorities, state and sectorial programs, regional programs, investment projects aimed at the development and provision of environmentally safe and economically efficient management of municipal solid waste (hereinafter referred to as MSW) and secondary material resources (hereinafter referred to as SMR) from the components of MSW is defined in the National Strategy for the Management of Municipal Solid Waste and Secondary Material Resources in the Republic of Belarus for the period up to 2035 (hereinafter referred to as the “National Strategy”).

The National Strategy is based on the Constitution of the Republic of Belarus and the laws of the Republic of Belarus, the principles and norms of international law, as well as on the documents of long-term strategic planning, including the National Strategy for Sustainable Social and Economic Development of the Republic of Belarus until 2030, the new version of which was approved at the meeting of the Presidium of the Council of Ministers of the Republic of Belarus on May 2, 2017

The conceptual structure of the National Strategy is specified according to Exhibit 1.

Public discussions of the National Strategy have been held in accordance with the Regulation on the procedure for the arranging and conducting public discussions of environment-relevant draft decisions, environmental reports on strategic environmental assessment, the reports on the assessment of environmental impact, tracking the environment-relevant decisions approved by the resolution of the Council of Ministers of the Republic of Belarus of June 14, 2016 No. 458 “On approval of the Regulation on the procedure for arranging and conducting public discussions of environment-relevant draft decisions, environmental reports on strategic environmental assessment, the reports of the

assessment of environmental impact, tracking the environment-relevant decisions and introducing amendments and modifications to specific resolutions of the Council of Ministers of the Republic of Belarus” (The National Legal Online Portal of the Republic of Belarus, 21.06.2016, 5/42219; 20/01/2017, 5/43221).

## **CHAPTER 2**

### **THE PURPOSE AND OBJECTIVES OF THE NATIONAL STRATEGY**

The purpose of the National Strategy is to identify the main directions for minimizing the harmful impact of MSW on human health, the environment, and the rational use of natural resources by preventing waste generation and maximizing the extraction of components contained in waste (organic matter, metal scrap, paper and paperboard, glass, polymers, textiles, worn tires, etc.), their use in the economy as additional sources of raw materials, materials, semi-finished products, other items or products in the production of goods (products), the performance of works, the provision of services with the introduction of modern collection technologies, composting of biological waste and the energy use of MSW in the form of RDF fuel, heat and electrical energy.

The objectives of the National Strategy are as follows:

- to assess the current state of MSW and SMR management in the Republic of Belarus, taking into account international experience;

- to define the main courses of the development of MSW and SMR management system aimed at improving the environmental safety of the existing and future MSW disposal sites; to increase the level of MSW processing and application, to improve infrastructure and choose effective technological solutions for MSW and SRM management, and to increase the efficiency of service providers’ activities in MSW and SRM management;

- to determine the forecasted amount of necessary investments in accordance with the investment plan of the National Strategy for Municipal Solid Waste and Secondary Material Resources management in the Republic of Belarus for the period up to 2035 in accordance with Exhibit 2 (hereinafter referred to as the investment plan);

- to ensure the financial stability of MSW and SMR management system, to determine the legislative and economic conditions for attracting investments.

The National Strategy ensures the achievement of performance indicators for waste management in the Republic of Belarus, established in the National Strategy for Sustainable Social and Economic Development of the Republic of Belarus until 2030 (Table 1).

Table 1

Performance indicators of government policy for waste management	2015 (actual)	2020	2025	2030
MSW usage, percent of total waste production	15,6	25	35	40

### CHAPTER 3 ASSESSMENT OF INTERNATIONAL PRACTICE IN MSW AND SMR MANAGEMENT

The acuteness of the waste problem is related to the global scale of its production. According to international experts, about 1.3 billion tons of municipal waste is collected annually across the world. In monetary terms, the volume of the municipal waste market in the member states of the Organization for Economic Cooperation and Development (excluding the new member states of the European Union) is estimated at about 120 billion US dollars. The most important are the markets of the USA (about 46.5 billion US dollars), the countries of the European Union (hereinafter referred to as the EU) (about 36 billion US dollars) and Japan (about 30.5 billion US dollars).

The necessity of solving the waste problem has led to the formation of an independent field of environmental policy aimed at developing the methods for organizing the collection of waste, its recycling (utilization), incineration, landfill, as well as stimulating measures for using waste in economy and the prevention of waste generation in the sources of its production. To denote this trend the term “waste management” has been coined and widely used across the globe and it means the control and regulation of all processes related to the production, storage, transportation, recycling, utilization and disposal of waste.

At the same time, the theoretical and methodological foundations for the establishment of an integrated system of environmental management and rational use of natural resources, including waste management, have not yet been fully developed in international practice, and practical approaches to the development of such a system, including mechanisms and tools for implementing the appropriate policy in this field are far from perfect and vary significantly in different states.

The main ways of waste management for the global community were identified at the International Conference on Sustainable Development in Johannesburg (South Africa) in 2002. They include the waste prevention, maximum reuse and recycling, as well as the use of alternative environmentally friendly materials.

In the EU, the legislative framework for waste management is established through two main directives: the Waste Directive and the Hazardous Waste Directive. The EU has adopted separate directives regulating the management of special types of waste: packaging, waste oils, the waste of waste treatment plants, batteries, end-of life vehicles, and waste electronic equipment.

The requirements of the EU directives are implemented through the national legislation systems of the member states.

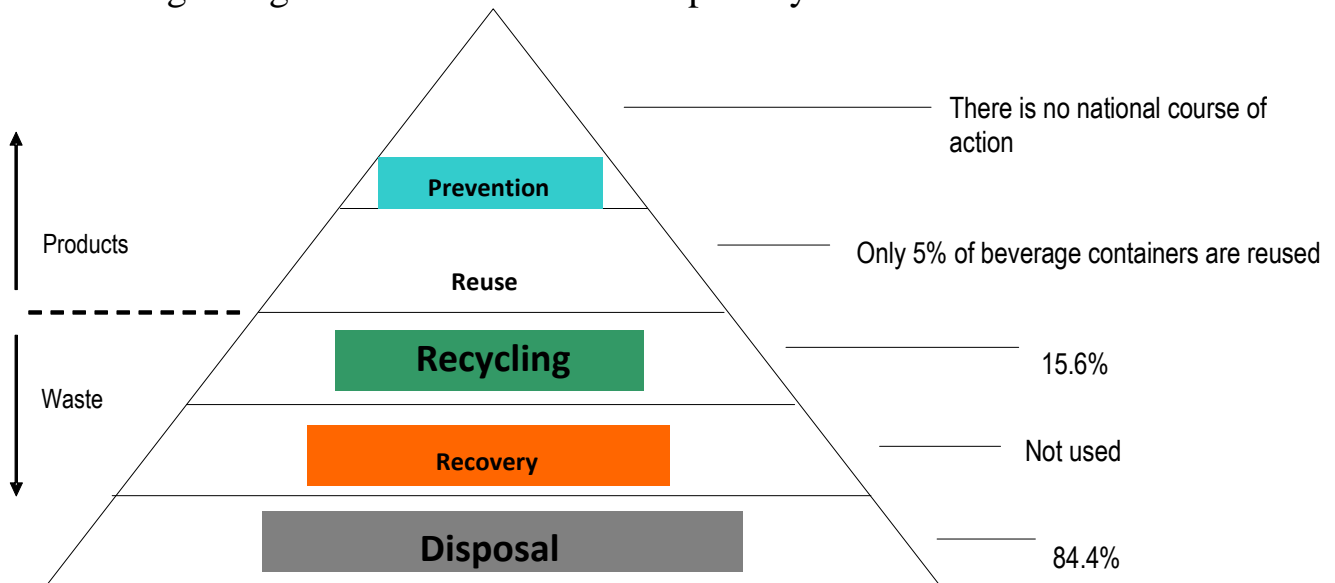
Currently, the following hierarchy of waste management methods (in descending order of priority) has been legislatively approved by the Waste Directive in the EU countries:

- prevention;
- reuse;
- recycling (treatment);
- energy recovery;
- final disposal (storage, landfill).

The organizations that tend to deviate from this hierarchy have to substantiate the advantages for humans and the environment in this case.

Waste prevention and reuse provide an overall reduction in waste production.

Figure 1 shows the hierarchy of MSW management in the Republic of Belarus regarding the structure of the European system.



Picture 1. Hierarchy of MSW management in the Republic of Belarus.

The produced municipal waste is used according to the methods that can be conventionally divided into the following three groups:

Recycling is the return of separate MSW components to the economy by separating them from the total mass and transferring them for use as raw materials

and production materials;

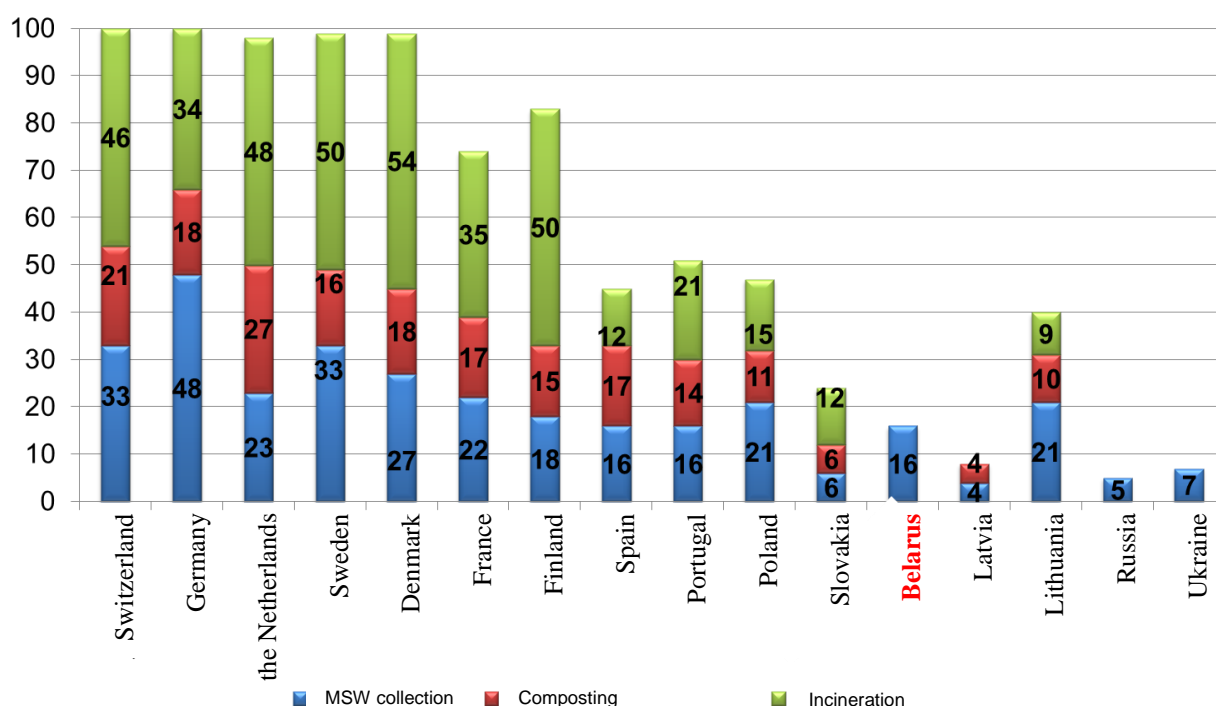
composting is the use of organic fraction of MSW after its biological treatment (decomposition of organic substances) using various microorganisms;

incineration is the use of mixed MSW or calorific fractions extracted from it in order to obtain thermal and (or) electric energy.

The application of these groups of methods differs significantly across the countries due to both the general level of social and economic development and a number of other factors and features of different countries.

Unused MSW is buried in specially equipped sites (waste landfills), taking into account the requirements for environmental protection.

The application of these groups of methods for the MSW use in the EU countries and the Republic of Belarus is presented in Figure 2.



Picture 2. The level of MSW use and landfill.

World experience shows that in the revenue structure of organizations for MSW collection and recycling, payments of waste producers (population, enterprises) and the manufacturers (suppliers) of packaging account for up to 90 percent (the principle of Extended Producer Responsibility). The revenue from the sale of secondary material resources extracted from MSW account for only about 10 percent.

At the same time, the costs and, correspondingly, the level of tariffs for the population and legal entities significantly increase with the increase in the

share of waste used from its total generation. Thus, the experience of international companies in EU countries shows that if the volume of waste use is within 30 percent of the volume of MSW generation, export tariffs amount to 20-30 euros per 1 ton. When the use of MSW increases to 70-80 percent of its generation, the tariff level increases to 100-120 euros per 1 ton.

According to Directive 1999/31/EC, the landfill of residual waste has been banned since 2005, and the establishment of high tax rates for waste landfill encourages the development of other uses of waste (energy use, composting of biological waste, etc.).

#### **CHAPTER 4**

##### **ASSESSMENT OF THE CURRENT STATE OF MSW AND SMR MANAGEMENT IN THE REPUBLIC OF BELARUS**

In the Republic of Belarus, waste management issues are as urgent as in the rest of the world. Waste is turning into a problem that threatens environmental safety and human health. It has an adverse effect on the environment, including land resources, subsoil, surface and groundwater, forests and other vegetation, as well as the animal habitat, the air environment and other environment components and objects.

According to the report on sanitation of settlements in 2015, about 21.4 million cubic meters of MSW, among them consumption waste accounting for about 80 percent or 17.2 million cubic meters were transported to MSW landfill facilities. The entire amount of waste transported for landfill is located in 165 landfills and 1706 mini landfills.

The waste management system in the republic is aimed at observing the priority of using waste over its neutralization or landfill, as well as the use of MSW that belongs to SMR in civil circulation.

Currently, the mechanisms used for the collection of SMR from MSW are:

the collection of SMR using the system of collection (procurement) points;

separate collection of MSW from the population by installing special containers for certain types of SMR and their further sorting;

the sorting of mixed municipal waste at waste recycling plants (hereinafter referred to WRP) with subsequent recovery of SMR;

the purchase of secondary raw materials under sales contracts from legal entities, the economic activity of which results in waste generation.

As of January 2016, more than 100 facilities of sorting and further sorting for separately collected municipal waste with a total capacity of about 360 thousand tons per year have been created.

Moreover, 5 sorting complexes operate in WRP, built in Gomel, Mogilev, Baranovichi, Brest, and Novopolotsk, with a total capacity of 300 thousand tons

per year. The facility for mechanical waste sorting with a capacity of 120,000 tons of MSW per year was built in Grodno in 2016.

The technologies used in the WRP built in the Republic are based on the sorting of incoming MSW in order to extract SMR. The experience of their work shows that the volume of SMR extracted from mixed MSW that is suitable for reuse amounts to no more than 10-15% of the total volume of incoming waste, (usually it is waste paper, glass, plastic, textiles, and tires) depending on the season, the remaining volume of waste forms a ballast and is transported to the landfill site.

In 2015, all collection systems collected and transported about 593.1 thousand tons of SMR to recycling. The level of MSW use reached 15.6%.

In addition, the volume of collection of certain types of SMR meets the European standards (figure 3). Thus, the volume of collection of paper and paperboard waste amounts to more than 70 percent, the volume of glass waste amounts to more than 60 percent, and the volume of polymer waste amounts to less than 20 percent of the generation volume.

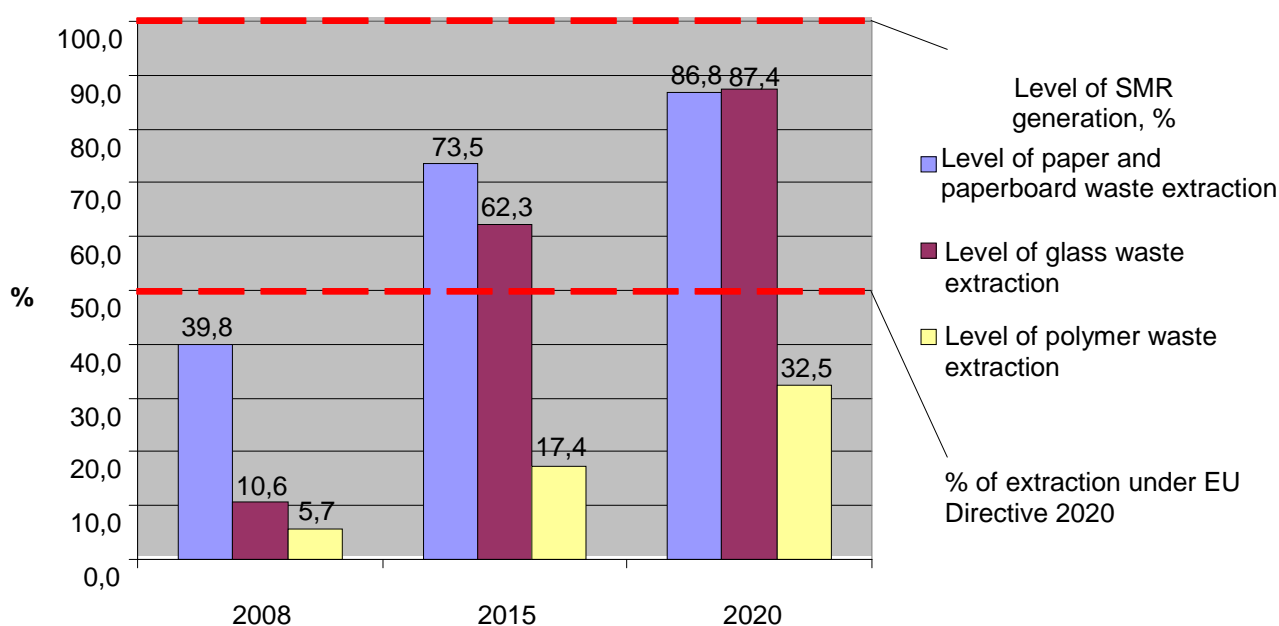


Figure 3. Proportion of the SMR extraction by types in the volume of generation (%).

### Conclusions on the assessment of the current state in MSW and SMR management in the Republic of Belarus.

1. The Law of the Republic of Belarus of July 20, 2007 “On Waste Management” (National Register of Legal Acts of the Republic of Belarus, 2007, No. 183, 2/1368) defined the basic principles of waste management that meet international standards.

2. State policy on evolutionary reforming of housing and communal services (hereinafter referred to as HCS) made it possible to preserve the

infrastructure and manageability of the system for collecting, procurement, and disposal of MSW.

3. For the period from 2003 to 2015, the conditions and infrastructure for the collection, transportation and disposal of MSW in accordance with sanitary and hygienic requirements and standards have been developed in the Republic of Belarus. Scheduled sanitation of settlements is ensured.

4. The majority of the population of the country maintains the relatively high level of sanitary condition of settlements, which is one of the main factors making the introduction of separate collection of MSW possible.

5. The steady increase in the collection and procurement of SMR was ensured: from 192.5 thousand tons in 2007 to 593.1 thousand tons in 2015 (in 3.1 times). More than 370 state and non-state organizations operate in the sector of collection and procurement of SMR.

6. In accordance with the Decree of the President of the Republic of Belarus of July 11, 2012, No. 313 “On Certain Issues of Consumption Waste Management” (The National Legal Internet Portal of the Republic of Belarus, 14.07.2012, 1/13623), the principle of extended responsibility of producers and suppliers of goods and packaging (hereinafter referred to as EPR) is introduced, and more than 13,000 business entities are involved in financing of MSW management system. As a result of the implementation of the EPR principle, the system of SMR collection has undergone drastic changes, and at the moment most SMR are collected through the procurement system. More than 90 percent of the extracted SMR were procured through the system of procurement points. More than 70 percent of the total SMR volume is procured by private companies.

7. The low efficiency of separate MSW collection is caused by a number of factors:

7.1. urban planning policy in the cities (planning of yard territories, design of houses with garbage chutes) does not take into account the new requirements for the system of separate MSW collection. It increases the cost of transportation and collecting MSW and SMR in the residential sector by more than 30 percent, and sometimes makes it virtually impossible.

The housing structure was formed in the course of implementing the social policy of the Republic of Belarus for the improvement of the housing conditions of citizens and the approved legal acts on urban planning policy.

The main features of the housing structure formed over the past 50 years include:

a high proportion of apartment buildings, the dwellers of which comprise 70% of the country’s population;

high housing density in regional centers, cities of regional subordination and Minsk;



project solutions are aimed at the construction of apartment buildings with more than 5 floors and garbage chutes;

sections for the MSW collection and removal aren't provided for in the norms for the design of apartment buildings and the infrastructure of yard areas;

over the past 20 years, the number of personal vehicles has increased by several times. It has caused additional technological difficulties due to the congestion of the yard areas by vehicles that entailed additional costs in the logistics of MSW collection and removal;

the planning of yard areas together with the continuing practice of designing of apartment buildings with garbage chutes was not considered as a technological part at the stage of the whole process of reforming the MSW management system.

In general, when designing the capacities for MSW sorting, the entire technological cycle of MSW management system, from collection to landfill, was not considered as a whole.

There are no mandatory norms and rules for the design of apartment buildings with garbage chutes in the legislation of the Republic of Belarus. However, despite the change since 2003 of the state policy in the field of MSW management, such buildings are still designed;

7.2. short supply of containers for separate SMR collection. The total demand for such containers is estimated at 150-160 thousand units, which is 2 times higher than their actual number;

7.3. minor investments in public work, poor public awareness;

7.4. the organizations that form the collection infrastructure are forced to purchase SMR through procurement points from the population, in comparison with the system in the EU, where the population arranges separate collection of these resources and delivers them free of charge. As a result, the entire system of separate collection and procurement has a very low added value, which, along with low tariffs for the export and landfill of MSW, makes it impossible either to derive profit from this type of activity or cover operating expenses.

8. The prohibition on landfill of SMR, established by the Law of the Republic of Belarus "On Waste Management", does not define the objectives, mechanisms and terms for implementing this legislative norm, nor is it linked to the gradual elimination of landfill of the waste that was not processed, according to the National Strategy for Sustainable Social and Economic development of the Republic of Belarus until 2030 and the Program of Social and Economic Development of the Republic of Belarus for 2016-2020, approved by the Decree of the President of the Republic of Belarus on December 15, 2016 No. 466 (National Legal Online Portal of the Republic of Belarus, 27.12.2016, 1/16792).

9. The hierarchy of priorities in the field of waste management has not been fully established at the legislative level. The prevention and/or minimization of waste generation in general and MSW in particular, including through the introduction of deposit-return systems, resource-saving technologies and energy use, are not codified by law as the main priorities of waste management system.

10. According to the system of distribution of powers among the state administration bodies in the field of MSW management, the local executive and administrative bodies have broad powers in the field of MSW and SMR management. However, such powers are not sufficiently supported by instruments, primarily economic instruments, for their implementation. The centralized procedure for setting tariffs for the population that do not cover operating costs and do not fulfill one of their main functions that is being a source of financing for the development of the MSW and SMR management system, as well as the liquidation of the budgetary fund for nature protection have deprived local executive and administrative bodies of the target source of funds, formed at the local level. Actual investments are planned at the republican level. This also applies to the funds transferred to the state institution “Operator of secondary material resources” (hereinafter referred to as the operator). As a result, regional programs for the MSW management are largely formal or do not exist.

In general, lack of a long-term strategy for MSW and SMR management and the existing funding system do not allow local executive and regulatory bodies to fully implement such management principles as interest and responsibility, which significantly reduces the management efficiency in the field of MSW and SMR management.

11. Reporting and the system of analytical accounting of MSW and SMR, from the generation sources of waste to its landfill, as well as approaches to determining the morphological composition of MSW and the generation standards of MSW in order to improve the reliability of results have to be improved. It is essential to develop a modern accounting system because at the moment the departmental accounting of MSW and SMR does not provide objective information about the real flows of MSW and SMR. The performed calculations and justifications show that the real volume of MSW generation in the Republic of Belarus is from 3 to 3.65 million tons by weight per year, taking into account the SMR, which is 15-20 percent lower than the current official estimates. There is no unified weight accounting system at the landfill sites in the country.

In addition, the current accounting system “on paper only” does not exclude the possibility of “double counting” of collected SMR.

Unreliable information on the volumes of MSW and SMR generation adversely affects the design decisions for the development of the system for the collection, sorting and utilization of MSW and SMR.

12. Technical and economic justification of the projects on the construction of waste sorting lines and WRP were based on the erroneous idea that the expenses for the entire technological cycle of MSW management (collection, sorting, recycling, and landfill) would be covered by SMR sales. In fact, the work experience in the Republic of Belarus and world practice show that 80-90 percent of all the revenues of companies in this sphere are formed through tariffs for MSW management.

13. Qualification requirements for business entities (specialized organizations) engaged in MSW management are not defined. The operators for MSW management cannot be selected on a competitive basis in the current situation. As a result the system of tender purchases for the provision of services in MSW management does not take into account the technological and economic characteristics of this type of activity and does not contribute to attracting investments in this sphere.

14. The material and technical base of the current system for the MSW management is largely obsolete and requires modernization and renewal. The unification of transport and container system is low.

15. Specialized organizations constitute a low proportion among the organizations providing services for the collection, removal and landfill of MSW. Among 124 organizations of HCS providing such services, only 12 organizations are specialized. This situation makes it impossible to fully analyze the efficiency of the activities of HCS organizations in the sphere of MSW management. The establishment of specialized regional organizations for MSW management is potentially productive.

16. Coordination of activities on the regional placement of organizations for the processing of SMR is not carried out at the government level. The bulk of MSW is concentrated in Minsk and Minsk region, and processing capacities for polymers, tires, waste paper are located in Grodno, Mogilev, as well as in Brest and Gomel regions. As a result, transportation costs are sometimes comparable to the cost of transported raw materials.

17. The utilization of polymer waste, which is the most dangerous to the environment, is at a low level. The solution to the problems of polymer waste utilization requires additional studies and is possible through the introduction of a deposit system for disposable consumer packaging (hereinafter referred to as DRS) and energy recovery.

18. The design capacities of the existing landfills for MSW landfill are now largely exhausted. In 2015, there were 165 landfills and 1706 mini landfills in the Republic of Belarus. More than 90 percent of the functioning landfills were built during the Soviet era. Insufficient number of landfills under

construction (from 2010 to 2015 only 10 new landfills were put into operation) and low financing of measures for their modernization (in 2008-2014, 65 landfills and 2222 mini landfills were modernized (fencing, observation wells, bunding and other) at an average cost of about 10 million rubles (before denomination) per facility) are not able to ensure the safe landfill of MSW in accordance with applicable law.

19. Legislation does not define environmental requirements for energy recovery and biological processing of the MSW organic fractions.

20. As the living standards of the population increase, the level of waste generation from electrical and electronic equipment (hereinafter referred to as EEE) increases too. EEE waste is a source of scrap of ferrous, non-ferrous and precious metals, as well as other types of SMR. Its management without observing environmental requirements leads to environmental pollution by heavy metals and halogenated organic compounds and the loss of material and energy resources.

The problems arising in the field of EEE waste management can be addressed through development of the existing environment-oriented system for collection, disassembling and recycling of EEE waste, as well as the necessary legal basis for this purpose.

21. When implementing the provisions of the Concept for the creation of capacities for the production of alternative fuel from municipal solid waste and its utilization, approved by the Resolution of the Council of Ministers of the Republic of Belarus of August 22, 2016 No. 664 (National Legal Online Portal of the Republic of Belarus, 26.08.2016, 5/42518 ) (hereinafter referred to as the Concept), the following aspects need to be considered.

The Concept identifies the main issues arising from the use of RDF fuel. If technological and environmental problems, taking into account the international experience of using such fuel, can be solved, the problems with the economic basis for ensuring its break-even production have not been worked out thoroughly enough, and reducing the prime cost of cement production by 1.5-2.8 percent is incompatible with the amount of investments. Taking into account the absence of the market for RDF fuel at the moment and the prospective monopoly position of cement plants in the future, an independent financial audit of these organizations is required before the project is launched. The impact of large-scale use of MSW for the production of RDF fuel on the economy of public utility facilities, related to the modernization of infrastructure (transfer stations, new landfills) and logistics, shall be calculated.

22. Analysis of the activities related to the collection (procurement) of SMR for the period from 2006 to 2015 showed that the effectiveness of investments in the system of SMR collection and procurement exceeds by more than 3 times the efficiency of investments in the construction of waste sorting stations and WRP.

23. The analysis and assessment of the current state of MSW management system in the Republic of Belarus show that the target level of MSW utilization in accordance with the National Strategy for Sustainable Social and Economic Development of the Republic of Belarus until 2030 can be achieved through:

improvement of the existing system of SMR collection and procurement, including the introduction of DRS;

the development of new directions in the MSW management and the introduction of technologies for the use of organic (biological) fraction of MSW and technologies for the energy recovery from MSW.

## CHAPTER 5 MAJOR WAYS OF THE DEVELOPMENT OF THE MSW AND SMR MANAGEMENT SYSTEM

### General Provisions

This chapter outlines the scenario of the National Strategy, which proposes the main focus areas in the field of MSW and SMR management as well as the sequence of their implementation and assesses the possibility of achieving the projected results.

The main provisions of the National Strategy are developed on the basis of the analysis of experience of the Republic of Belarus in enhancing MSW and SMR management from 1992 to 2015 and in line with a comprehensive assessment of international MSW and SMR management practices.

Based on the evaluation of the capacity of MSW generation and its morphological composition, the following forecast was made up to 2035:

MSW generation per capita will range from 320 to 380 kg with due regard to the growth of gross domestic product;

the annual MSW generation capacity is estimated to be in the range of 3.5 to 4 million tons;

the maximum possible and economically feasible SMR extraction will make up approximately 25 per cent, of which 15.6 per cent are being collected at the moment;

the maximum percentage of energy recovery will amount to 38.5 per cent in case of RDF fuel production from MSW, while in the event of incineration of residual waste this value is expected to amount to 60-65 per cent.

Figure 4 shows the main ways of using raw materials from the morphological composition of MSW.

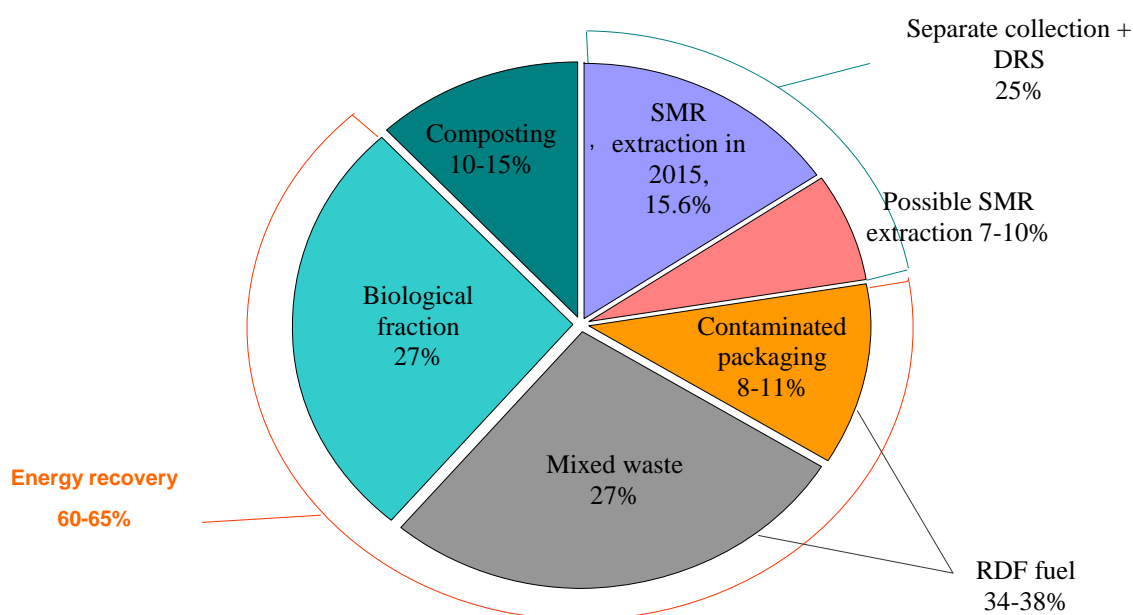


Figure 4. Major ways of using raw materials from the morphological composition of MSW.

The major priorities of the National Strategy implementation are based on the principles as follows:

sustainable waste management: ensuring proper control over all operations with waste as well as decrease in environmental damage associated with waste landfill in short-, medium- and long-term perspectives;

"the polluter must pay": the person responsible for pollution of the environment must bear waste management costs approved by the state authorities to ensure an acceptable state of the environment;

openness and transparency: gradual and steady introduction of open tenders for services, transparent evaluation of bids submitted, and fair application of norms and standards;

hierarchy of waste management technologies;

the implementation of the best available and efficient technologies;

proximity of recycling facilities to the source of waste generation.

The National Strategy is represented by a list of targeted activities which are divided into 5 groups (modules) (Figure 5).

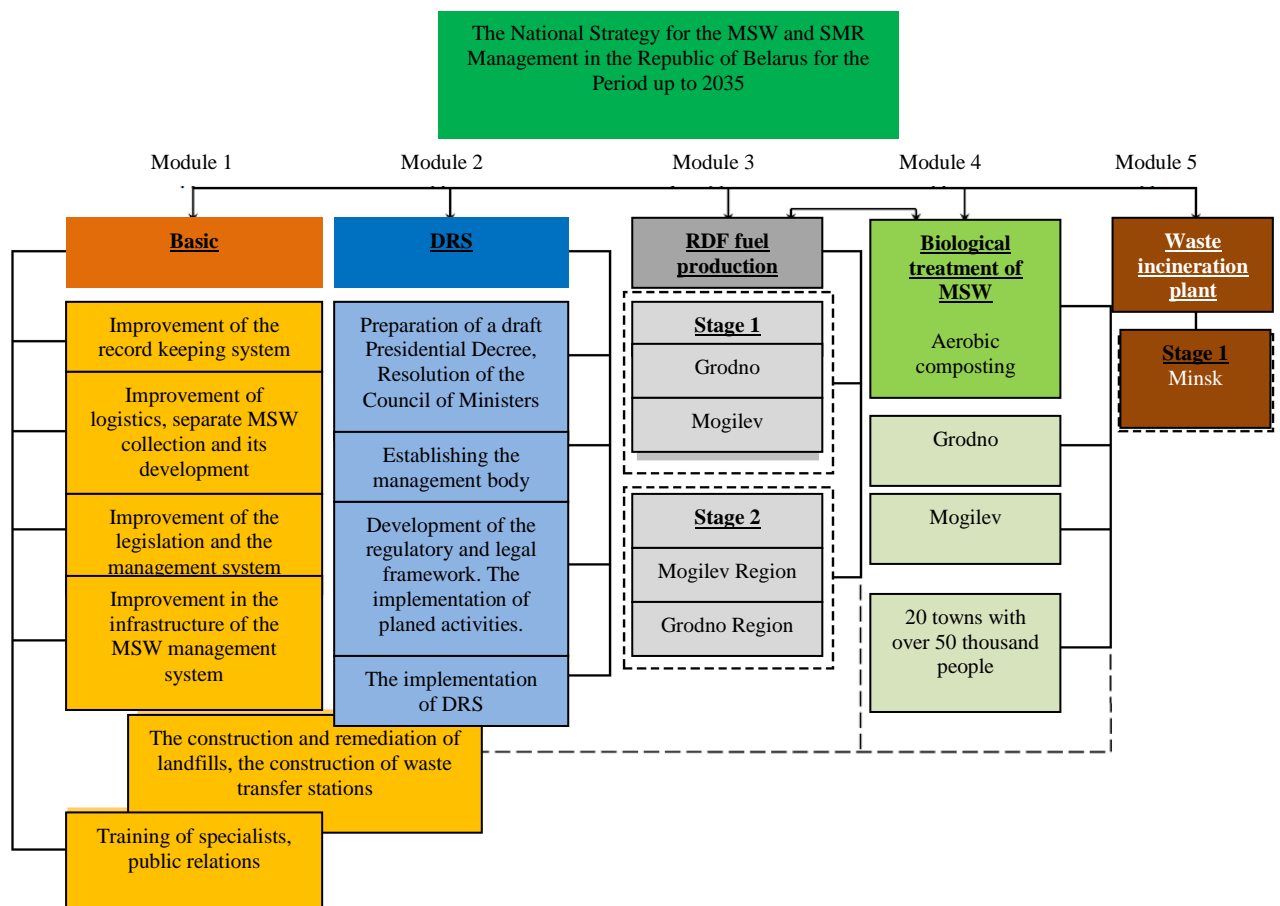


Figure 5. Priorities (Modules) of the National Strategy.

The main priorities of the National Strategy (Modules 1 – 4) are interconnected with organizational and technical activities as well as the infrastructure of MSW collection, storage and management.

The construction of an incineration plant (Module 5) is a separate technological solution for the City of Minsk.

## The Enhancement of the Existing System of MSW Management (Module 1. Basic)

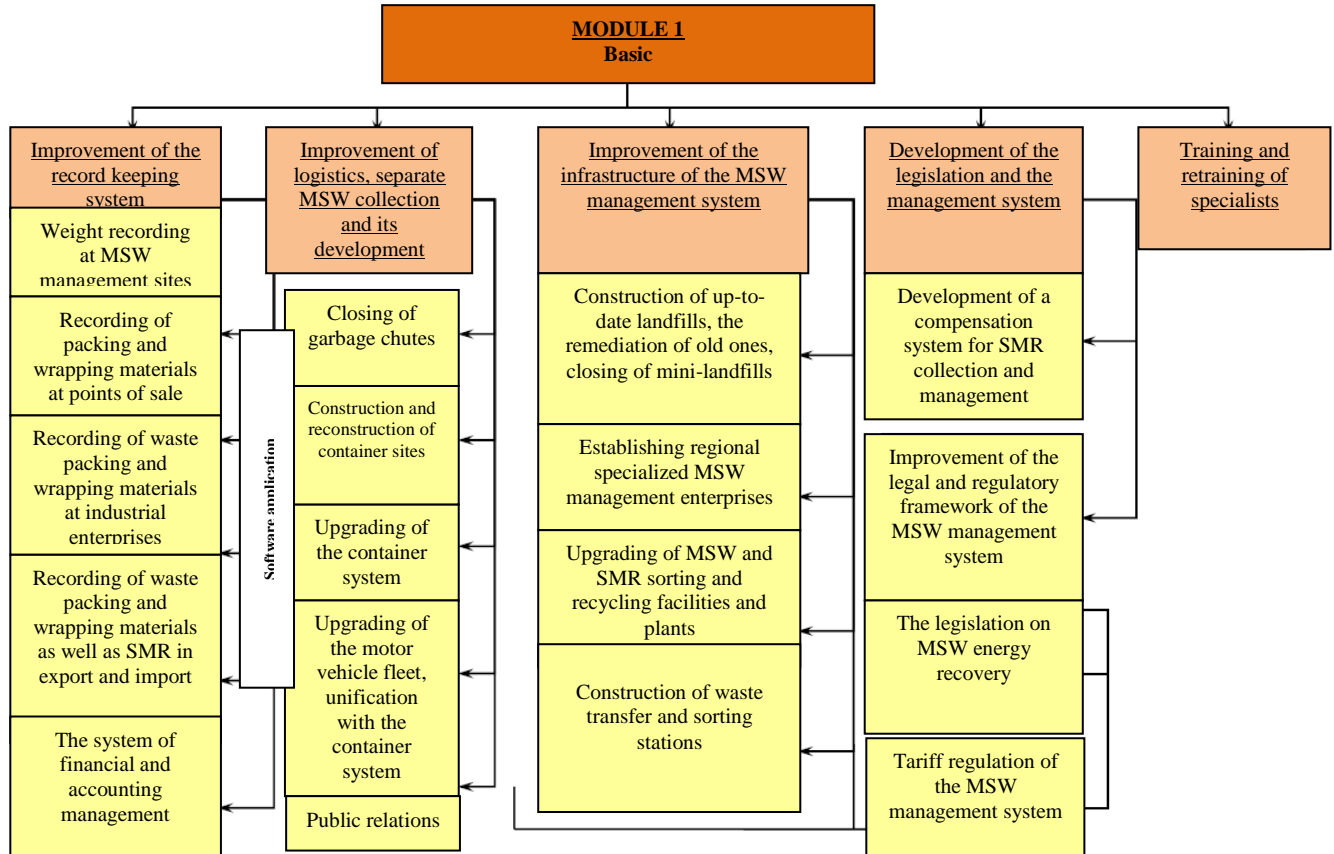


Figure 6. The MSW Management System (Module 1).

The improvement of the MSW management system includes the activities as follows.

### Improvement of the Record Keeping System for MSW and SMR Volume of Generation, Landfill as well as Morphological Composition

The key tool for the improvement of the record keeping system for MSW and SMR volume of generation and landfill as well as morphological composition is a monitoring system in the field of MSW management.

The monitoring system shall be based on information technology resources, while simultaneously ensuring:

that the authorized body keeps an information and analytical database, which includes data on quantitative and qualitative indicators of all types of MSW and SMR



the design and development of a unified MSW and SMR web portal containing:

a section for investors aimed at involving the investors in the development of this sector;

a section for the general public to ensure public awareness.

The information and analytical database is created for the purpose of preparing and updating multidimensional information displaying a related set of data, which serve as the basis for prompt and well-grounded decision-making.

The information and analytical database shall ensure proper integration of information obtained from various subject areas related to the MSW and SMR management, its updating, use of effective tools to analyse and display aggregated and interconnected subsets of information, and accessibility to users of different levels in accordance with their powers and authority.

### **Improvement of Logistics, Separate Collection of MSW and its Development**

The enhancement of logistics of MSW collection and improvements in the entire infrastructure include a set of interrelated organizational and technical activities requiring a substantial part of all investments in the MSW and SMR management system.

From the point of view of efficiency of investments and optimization of further operating costs, the development of separate MSW collection is a priority in comparison with the practice of sorting the entire mass of mixed MSW.

The development of a separate collection system should be underpinned by constant and systematic work with the general public, which includes raising public awareness about the need for separate collection of waste, the implementation of environmental programmes in educational institutions aimed at promoting the environmental culture among the younger generation, the preparation and dissemination of information materials among citizens and organizations.

Upgrading of the transport fleet, container system, logistics and collection infrastructure (container sites, garbage chutes) will reduce waste removal costs by 18-25 per cent.

### **Container Sites and Garbage Chutes**

Over 22.5 thousand sites for waste collection are operational in the Republic of Belarus at present, the major part of which was designed and built along with housing units in Soviet times. Design solutions to their construction were oriented towards removal of mixed MSW. As a result, their number, size

and location do not meet the requirements of the current MSW management system.

Garbage chutes as a structural element of the residential building and as a technological element of the MSW collection system negatively affect efficiency of the separate collection system and worsen sanitary conditions of houses.

Container sites should provide for collection of both MSW and SMR. Their location should be rational and convenient for the population and organizations involved in waste removal. In many respects this ensures efficiency of separate MSW collection and affects logistics of collection, transportation costs, as well as sanitary conditions of residential areas.

When decommissioning over 22 thousand operating garbage chutes, it will be necessary to build additional 6 thousand container sites.

### **The Container System and Waste Truck Fleet**

There are two stages applicable to upgrading of the container system and waste truck fleet

In the period until 2025, it is planned to simultaneously use containers and waste trucks with both rear and side loading systems. Waste trucks with the side loading system will be gradually replaced by waste trucks with the rear loading system. To this end new containers will be installed. At the same time, the number of containers for SMR collection will be systematically increased.

As a result, starting from 2025 it is expected to use containers and waste trucks only with the rear loading system.

In the future, investments will be made only in replacement of containers and waste trucks with respect to their wear and tear.

The annual need for upgrading the fleet of containers and waste trucks is estimated at 7,000 items for MSW collection, 35,000 items for SMR collection, and 150-200 waste trucks. In the period from 2017 to 2020, it is planned to reduce the total number of waste trucks by 483 items due to decommissioning of trucks with the side loading system.

These estimates were made with no regard to changes in regional layouts of MSW landfills as well as in the construction of waste transfer stations, which will alter the structure of the waste truck fleet towards heavy vehicles, for which reason new calculations for specific regions of the country will be required.

## **Improvement of the Infrastructure of the MSW Management System**

### **Waste Landfill Facilities**

With the aim of solving the problem of safe landfill of MSW, it is necessary to develop a long-term programme aimed at constructing new landfills as well as closing and remediating decommissioned ones in accordance with up-to-date requirements of environmental law.

The programme for the construction of new landfills should be developed with due regard to the introduction of modern technologies (processing of biological waste, energy recovery), which will entail the creation of multifunctional regional MSW management enterprises. This is highly significant for regions with low population density and low MSW concentration. The programme should be linked with the construction of transfer stations.

In the period up to 2035, it is necessary to build at least 6 landfills per year.

According to aggregated estimations, it will be necessary to invest approximately 176 million roubles (80 million euros) to remediate the existing landfills and mini-landfills with the total area of about 800 hectares, and about 638 to 770 million roubles to build 130 new landfills with the total area of 640 hectares (290 - 350 million euros).

The main source of financing for the construction and remediation of landfills can be a special waste landfill fee. Issues related to its imposition are set out in Chapter 7 hereof.

### **Transfer stations**

Transfer stations should become one of the main elements of the infrastructure within the MSW management system.

The construction of transfer stations should be preceded by technical and economic calculations based on a complex approach which enables to take into account many factors, such as the reduction of mini-landfills, the placement and construction of regional landfills, possible options for introducing new technologies for MSW management (for example, use of RDF fuel in cement plants located at a distance of 250 - 300 km from the main sources of raw materials), MSW accumulation rates (daily, weekly, monthly), especially as regards rural areas. The construction of transfer stations will give rise to a

change in the structure of transport and logistics of the MSW management system.

With reference to the total MSW mass produced annually in the Republic of Belarus and the average capacity of a transfer station of 60 tons per day (22,000 tons per year), up to 117 transfer stations for 180 million roubles (82 million euros) of total investments may be required in the period until 2035.

The investment plan shows the projected total amount of investments necessary to implement steps aimed at enhancing both logistics and the collection infrastructure within the framework of the basic module (Module 1).

According to the calculations, the average annual investment flow for Module 1 is projected to stand at about 88 million roubles (40 million euros), which is twofold as compared to the current investments. The basis for investment growth will be formed by the funds allocated for the construction and remediation of landfills.

### SMR procurement

SMR is procured from individuals and legal entities by the organizations pertaining to the Belarusian Republican Union of Consumer Societies, Belresursy State Association – Managing Company of Belresursy Holding, HCS and non-state organizations, for which purpose over 1,900 collection points, including mobile ones, have been put into operation.

For the future it is advisable to maintain the SMR procurement system as well as economic mechanisms stimulating collection initiated by legal entities and self-employed entrepreneurs for the purpose of further SMR use in the economy pursuant to Presidential Decree No. 313 dd. 11 July 2012.

A certain transformation of the SMR procurement system will occur owing to implementation of DRS (Module 2) by integrating the existing infrastructure of the collection points into DRS.

### **Improvement of the Legislation and Regulatory Framework for MSW and SMR Management**

The main ways of improving the legislation are based on the following national waste management priority areas ensuring the implementation of the main principles of the state policy in this field.

1. Providing a legislative framework for a hierarchy of waste management methods and approaches by, inter alia, the Law of the Republic of Belarus “On Waste Management”.

2. Updating of legislative provisions of the Law of the Republic of Belarus “On waste management” setting forth a ban on SMR landfill with

respect to the real mechanisms and terms of achieving this goal and their concordance with step-by-step imposition of a ban on landfill of unprocessed waste.

3. Updating of the terminology used in the waste management legislation (including terms in relation to municipal waste), harmonization of the National Waste Classifier with the European Waste Catalogue as well as the Federal Waste Classification Catalogue of the Russian Federation.

4. The establishment of special technical requirements, which, through the technical regulations of the Republic of Belarus and the Eurasian Economic Union, will restrain and further prohibit the market release of goods and packages that can't be recycled.

5. The development of legislative acts regulating the procedure for the operation of deposit-return system for disposable food (beverages) package (made from glass, plastic and metal), as well as acts stimulating use of multi-way packaging.

6. Updating of state programmes in order to harmonize the indicators of SMR extraction and use in the total volume of MSW, as well as approaches and methods aimed at achieving the objectives set forth in these programmes.

7. The development of unified requirements (rules) for the subjects of all forms of ownership employed in the MSW management, including mechanisms of attestation and certification procedures, as well as requirements applicable to selection of applicants for the provision of MSW management services by tender; the determination of performance indicators of organizations engaged in MSW management.

8. The systematization, revision and supplementation of legislative acts on management of municipal waste for the purpose of defining and regulating:

- legal issues on the creation (acquisition) and termination (transfer) of ownership rights to municipal waste as well as transactions therewith;
- uniform rules applicable to municipal waste management;
- procedures applicable to the development and approval of regional schemes for municipal waste management;
- procedures applicable to MSW management in the territory of settlements;
- procedures applicable to determining the morphological composition and standards with respect to municipal waste.

9. The development of legal acts, including technical legal acts which set forth special rules for management of certain types of MSW (EEE waste, packaging, transport, etc.) and use of MSW as energy resources (biodegradable waste, RDF fuel, and other).

10. The improvement of the existing EPR system with regard to producers and suppliers of certain types of goods and packages stipulated by Presidential Decree No. 313 of the Republic of Belarus dd. 11 July 2012, including:

the improvement of procedures for spending of funds received by the operator as payments from producers and suppliers of goods and packages (hereinafter referred to as the 'operator's fund'), including allocation of funds by local executive and administrative bodies for the purposes including but not limited to the purchase of property (machinery, equipment, containers, etc.), financing of investment projects as well as state and territorial programmes in the field of waste management, in order to prioritize financing of projects for closed-cycle waste management (collection, sorting, recycling);

an increase in efficiency of state, business and public control over spending of the operator's fund, including activities aimed at creating expert councils (comprised of economists, environmentalists, etc.), business councils (comprised of manufacturers, suppliers of goods and packages and persons dealing with waste of goods and packages) and public councils;

the application of the EPR principle to production waste with the transfer of responsibility from manufacturers (suppliers) of certain types of packages to producers of packaged goods (industrial packaging consumers) with due regard to the requirements of deposit management of packaging waste, and the inclusion of metal packaging in the EPR scope (tins made of aluminium and tinplate) as well as extension of opportunities for fulfilling obligations by producers and suppliers of goods and packages;

the development of public and private partnership, creation of joint organizations, as well as attraction of direct foreign, including private, investments in waste management.

## **DRS (Module 2)**

Introduction of DRS is one of the activities of the Comfortable Housing and Favourable Environment State Programme for 2016-2020 approved by Resolution No. 326 of the Council of Ministers of the Republic of Belarus dd. 21 April 2016 (The National Legal Online Portal of the Republic of Belarus, 19.05.2016, 5 / 42062).

DRS is based on economic stimulation of consumers to return used packages by introducing the amount of deposit: when buying packaged goods, consumers pay the deposit for the package, and when returning empty packages, consumers get the deposit back.

Objective prerequisites for the introduction of DRS in the Republic of Belarus are represented in recent years by successful development of the system of SMR procurement from the population on a fee basis and the existing well-developed network of collection points for secondary raw materials.

The developed draft Concept on Introduction of a Deposit Package Management System (hereinafter referred to as the 'draft Concept of DRS)

shows the possibility of introducing this system and its sustainable functioning without using budget funds.

DRS will include disposable consumer packages made of glass, PET and metal (1.8 billion packages per year according to estimates), except for packages intended for socially important goods, including baby food and dairy products.

The draft Concept of DRS offers a centralized model of DRS, in which management bodies are accountable for the tasks as follows:

- the registration of all participants and all kinds of packages for beverages involved in DRS;

- the development and approval of agreements (contracts) between all participants of DRS;

- the management of the labelling standard and maintaining an information database on the flow (quantity) of filled and empty consumer packages;

- the management of collection logistics (conclusion of contracts on transportation, storage and processing of packages) and SMR sale (conclusion of contracts);

- the collection of data from points of automated and manual collection of containers and quality control of procedures for manual and automated collection of deposit packages;

- the promotion of DRS among consumers; reporting.

Manufacturers and importers of packages and packaged goods (about 1,500 organizations) included in DRS will be exempted from the existing fees for organizing collection, neutralization and (or) use of waste.

Types and material of packages, the amount of deposit, the waste management fee, mechanisms and terms applicable to settlements between the participants of DRS, as well as a number of other issues will be determined at the preparatory stage of implementation after receiving information on financial and material flows related to packages included in DRS.

The preparatory phase covers up to 1.5 - 2 years. It is advisable to start the preparatory phase in 2017.

All participants of the system should exchange information on the number of packaged goods delivered to the market and the volumes of returned packages.

The calculations show that at practically equal costs for the collection of packages, efficiency of DRS is in 2 to 3 times higher (at least 80 per cent of packages is returned to circulation, compared to 18-30 per cent in the existing system) in contrast to the current system.

The experience of the implementation of DRS in the Republic of Lithuania in the first half of 2016 showed that the return of the package made up 77 per cent instead of the projected 50-60 per cent. In the period from

January to October 2016, about 7,500 tons of PET packaging were collected, which corresponds to the annual volume of collection of similar SMR in the Republic of Belarus.

DRS will operate in parallel with the existing system of separate collection of MSW and will enable to extract up to 10% of SMR from municipal waste, which consequently will reduce MSW landfill.

The implementation of a set of investment programmes and activities aimed at improving the system of separate collection and the entire infrastructure for MSW management (Module 1) should be coordinated with the term and measures for the implementation of DRS (Module 2).

The introduction of DRS will reduce investment and operating costs with respect to Module 1. According to estimates, investments in the container system will be diminished by 33-44 million roubles (15-20 million euros) owing to the introduction of DRS, while collection costs will decrease by about 30 per cent due to the reduction of the standard of MSW generation and optimization of the existing mechanical sorting of MSW. The annual saving for utilities will account for about 34.3 million roubles, or 15.6 million euros, with regard to the existing volumes of sorting of mixed MSW of about 400 thousand tons per year.

The introduction of DRS has additional advantages:

- an increase in the collection of SMR involved through DRS will not require additional budgetary sources of financing and an increase of the waste management fee for the population as compared to the separate collection system;

- a high level of SMR processing from deposit packages (almost 99 per cent);

- growth of revenues from sale of high-quality raw materials. The annual turnover can make up to 15 million euros (PET, glass, aluminium);

- substantial saving of budgetary funds, since in all countries where the system operates it is funded by its participants, including the population;

- the creation of new jobs;

- the creation of a system for recording material and financial flows of disposable consumer packaging, which will contribute to the creation of a unified MSW and SMR recording system.

The introduction of DRS in the Republic of Belarus aims:

- to achieve up to 25 per cent MSW use of the total volume together with the implementation of activities of Module 1;

- to reach at least 80 per cent collection of deposit packages.

The investment plan contains aggregated calculations of the main investments in DRS.

In many respects the investment flow in DRS will depend on effectiveness of integrating the existing collection infrastructure into DRS. It is



necessary to take full advantage of the network of collection points pertaining to the Belarusian Republican Union of Consumer Societies, Belresursy State Association – Managing Company of Belresursy Holding, HCS, organizations without departmental subordination, storage areas, warehouses and other facilities of the existing infrastructure.

### **MSW Energy Recovery (Modules 3 and 5)**

In order to create favourable conditions for the introduction of MSW energy recovery technologies (incineration of mixed waste, use of RDF fuel in the cement industry and boiler houses), it's necessary to adopt a number of legislative provisions setting forth:

- the use of energy produced by incineration plants applying MSW as fuel;
- the requirements for emission standards applicable to the incineration of mixed waste and use of RDF fuel as well as for the use of combustion products (ash, slag and dust);

- the requirements for fuel with due regard to their harmonization with the documents of the EU and the Eurasian Economic Union;

- economic incentives for waste energy use, including regulation of the amount of environmental fees for air emission as well as compensation payments.

Around the globe, organizations selling energy derived from waste are generally encouraged economically as producers of energy from renewable sources. This is due to substantial investments in the infrastructure of incineration plants and the production of RDF fuel, while being also aimed at minimizing economic risks of business entities engaged in this field. Environmental benefits derived from MSW energy recovery are prioritized in comparison with economic ones.

### **RDF Fuel (Module 3)**

Technologically, it is expedient to integrate the production of RDF fuel from mixed MSW into a mechanical and biological MSW processing facility, where the first stage includes a technological operation aimed at separating the biological fraction from the total mass of MSW, the second stage implies the extraction of SMR suitable for reuse in the process of sorting, and the third stage requires a technological operation for the production of RDF fuel from the remaining part of MSW. Such a comprehensive solution enables to optimize costs and increase revenues of a MSW sorting (processing) company.

Sources of covering expenses for RDF fuel production can be represented by revenues from sale to consumers, tariffs for the MSW management service, as well as compensation payments from producers and importers of goods and packaging for organizing the collection, neutralization and (or) use of waste.

Table 2 shows approximate investments in the module for RDF fuel production with a total capacity of the plant of 100 thousand tons per year.

Table 2

Type of investment	Amount of investment, million roubles/million euros
Buildings and facilities	3.21/1.46
Equipment	4.78/2.17
Transport and loading facilities	0.2/0.09
Working capital	0.15/0.067
<b>Total</b>	<b>8.34/3.79</b>

According to the Concept, the total need of Belarusian cement plants for RDF fuel is estimated at 300 - 450 thousand tons per year (when performing operations for roasting raw meal in calciners on the basis of RDF fuel).

At the first stage, the National Strategy provides for RDF fuel production in the cities of Mogilev and Grodno based on the existing sorting capacities and the available MSW volumes, as the main consumers (cement plants) are far away from the main sources of raw materials (Minsk, Minsk Region) .

The results of the implemented pilot projects will be followed by an assessment of the need to increase the use of MSW as RDF fuel under Resolution No. 664 of the Council of Ministers of the Republic of Belarus dd. 22 August 2016 and its future amendments.

When deciding on RDF fuel production, it is necessary to take into account its economic feasibility for cement plants, which must additionally invest up to 3 million euros in the fuel supply mechanism, additional purification of pollutant emission into the air and construction of warehouses.

The facilities for the use of RDF fuel must meet the requirements in the field of environmental protection brought into force and effect in the Republic of Belarus.

The investment plan includes a rough calculation of the main investments in RDF fuel production for the first stage.

## **Construction of an Incineration Plant in Minsk (Module 5)**

The construction of an incineration plant in Minsk has both economic prerequisites (availability of raw materials, electricity and heat consumption infrastructure, remoteness from sources of RDF fuel consumption – cement plants) and environmental feasibility (high concentration of waste, limited opportunities for the expansion of operating landfills).

In order to attain the best economic and environmental results and reduce specific capital costs when burning MSW, the design capacity of the plant should make up 500,000 tons per year.

Approximate investment costs of building an incineration plant with a capacity of 500 thousand tons per year in the vicinity of Minsk will account for about 440 million roubles (200 million euros). The period of construction will make up 2 years. The volume of waste after incineration will be reduced to 20 - 30 per cent. Through effective use of slag and ash, the volume can be diminished to 10 per cent.

The construction of the incineration plant requires a land area of about 3 hectares. Following 20 years of operation, an investment in the amount of 50 per cent of the initial investment will be required, which will constitute approximately 220 million roubles (100 million euros).

In the EU states, the cost of burning 1 ton of mixed waste makes up about 220 roubles (100 euros). Provided that electric power and heat are sold, the minimal cost can make up 66 - 132 roubles per ton (30 - 60 euros per ton).

Commissioning of such a plant will reduce the volume of waste delivered to landfills by 10 to 15 per cent on a nationwide scale.

To successfully implement this large-scale project, it is proposed to attract an investor having sufficient experience and capable of ensuring design, construction and further operation of the enterprise.

At the stage of decision-making, it is necessary to take into account the impact of the planned development of a separate MSW collection system in Minsk and implementation of DRS, since reuse of SMR takes priority over burning.

## **Biological Treatment of MSW (Module 4)**

The method of biological treatment is proposed as an addition to mechanical treatment (sorting) of MSW.

The use of aerobic composting technology in addition to RDF fuel production will allow obtaining 10-15 per cent of the structural material from

the total volume of MSW for its further use in landfills instead of mineral and vegetable soil, including its use for the remediation of landfills.

Taking into account RDF fuel production and composting, the level of MSW landfill can be reduced to 45 per cent.

Table 3 shows estimated investments in the production system for biological waste treatment (aerobic composting) with a capacity of 50,000 tons of the fine MSW fraction generated during RDF fuel production.

**Приложение А. Table 3**

Type of investment	Amount of investment, million roubles/million euros
Construction of buildings and facilities	5.1/2.3
Vehicles	0.8/0.37
Planning and design	0.5/0.23
<b>Total</b>	<b>6.4/2.9</b>

Sources of covering the costs of the composting technology can be represented by the saving on the cost of mineral and vegetable soil required for the operation of the landfill and tariffs for the MSW management service.

Instead of the aerobic composting technology, the anaerobic digestion (fermentation) technology enabling to produce biogas and to further use it for the production of thermal and (or) electric energy can be put into place in the future.

Gross investments in such a biological treatment module with a capacity of 40 - 50 thousand tons of organic fraction account for approximately 26.4 million roubles (12 million euros), while operating costs in terms of 1 ton of MSW are about 36 roubles (16.4 euros). In case of this technology, additional sources of funding will be required to cover operating costs.

In addition, it is advisable to develop a system of separate collection of organic waste in the sector of private house building as well as on the basis of cleaning of urban green areas.

This will make it possible to reduce landfill of mixed MSW and obtain the material suitable for use not only in terms of landfill remediation, but also in the green sector of residential areas as well as in agriculture.

## **CHAPTER 6 INVESTMENT PLAN**

The investment plan is an assessment of the need for investment to implement the goals and objectives contained in the National Strategy and the possibility of their distribution by sources and periods until 2035.

When developing the investment plan, the foreign studies and expert assessments from the domestic practice dedicated to MSW and SMR management were used.

The investment plan is calculated in Belarusian roubles and euros (at the average official exchange rate of BYN against EUR for 2016, equal to 2.2005 roubles for 1 euro) without regard to inflation.

Flows and sources of investments for the years indicated in the investment plan may change as the terms of the implementation of the activities stipulated in the National Strategy alter.

The total amount of investments in 2017 - 2035 is estimated at 1,224.1 million euros, including investment flows for the periods as follows (on average):

2017 - 2020 – 277.6 million euros;

2021 - 2025 – 382.2 million euros;

2026 - 2035 – 564.3 million euros.

The structure and volume of investments in upgrading of the existing infrastructure of the MSW and SMR collection system (Module 1) are presented in Table 1 of Annex 2 hereto and are estimated at 1,570.5 – 1,702.5 million roubles (713.7 - 773.7 million euros ).

The main investments in DRS are given in Table 2 of Appendix 2 hereto and are estimated at 188.1 - 221.2 million roubles (85.5 - 100.5 million euros).

Investments in the module of biological waste treatment (composting) are estimated at 89.34 million roubles (40.6 million euros).

Investments in RDF fuel production for the first stage are estimated at 40.05 million roubles (18.2 million euros).

Investments in the construction of an incineration plant in Minsk are estimated at 660 million roubles (300 million euros).

Figure 7 and Table 3 of Annex 2 hereto present the breakdown of investments by types and sources of financing.

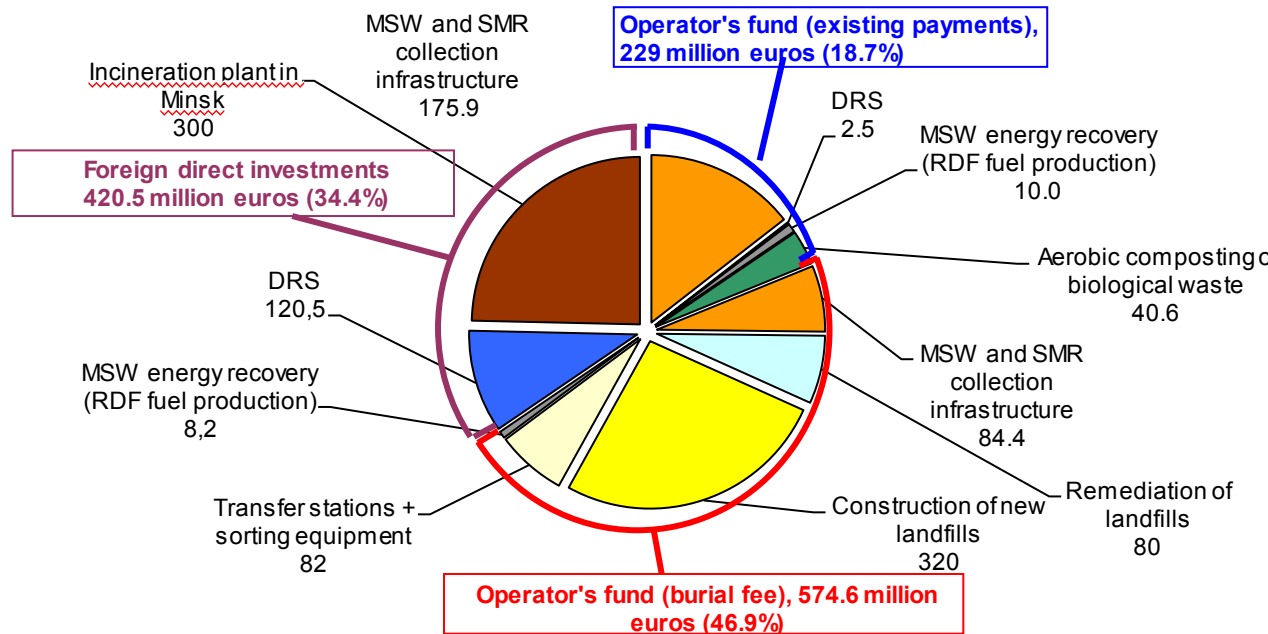


Figure 7. Breakdown of Investments by the Main Priority Areas of the MSW Management System (In Million Euros).

Investments in the implementation of the main priority areas of the National Strategy (Modules 1-5) are additionally linked with an estimate of the required operating costs by volumes and sources (Table 3 of Annex 2 hereto).

## CHAPTER 7 FEATURES AND STAGES OF THE IMPLEMENTATION OF MAJOR PROVISIONS AND ACTIVITIES OF THE NATIONAL STRATEGY

### Initial Situation (2006 – 2015)

The indicators of investment and operating costs for 2006-2015 presented in Table 4 are aggregated country-wide data from all sources of financing (budgets of all levels, the operator's fund, amounts of MSW management tariffs obtained from the population and legal entities, direct investments, environmental funds, etc.).

An increase from 5.4 to 15.6 per cent in the level of MSW use of the total volume of waste generation for the period was ensured by investments in the amount of 214.3 million euros, growth in production costs by 1.7 times and in MSW management tariffs by 2.4 times. As tariffs for MSW management did not have an investment component in their structure, all investments in the MSW management system were targeted and centralized.

### Stage 1 (2017 – 2020)

During this period, the introduction of key technological solutions as well as an improvement in the legislation will begin, which will give rise to achieving the National Strategy indicators in the forthcoming years.

Priority will be given to the development of long-term investment programmes, which will form the basis for the modernization of the existing infrastructure for MSW and SMR management and the implementation of DRS by 2020.

DRS operating costs will not affect MSW management tariffs, since they are covered by deposit fees. The starting conditions for the implementation of this project can be foreign direct investments and credit lines provided by domestic banks. The main source of refinancing of DRS will be depository fees, unreturned deposits and revenues from sale of SMR.

In addition, this stage includes the establishment of a RDF fuel production facility in Grodno as a project with the greatest potential for rapid implementation.

### Stage 2 (2021 – 2025)

This period is characterized by major investments in the MSW management system, which is primarily due to investments in the construction of new landfills and transfer stations as well as an incineration plant in Minsk.

Due to the lack of experience in designing, building and operating of incineration plants in the Republic of Belarus, it is optimal to develop framework conditions and to declare an international investment tender. This approach will optimize operating and investment costs of the project as well as create starting conditions and the opportunity to attract foreign direct investments.

The main sources of reimbursement of investment and operating costs for the operation of such a plant are as follows:

- saving on the special waste landfill fee;
- revenues from the sale of heat and electricity.

Successful implementation of the activities set forth by the National Strategy will depend on the creation of a funding system based on constant fund-building indicators, which presently include MSW management tariffs for the population and legal entities and the fund formed by the operator from funds of manufacturers and suppliers of goods and packaging. In aggregate, they form the total amount of financing (operating and investment costs) and enable to predict its size for a long period to a great extent, since the basic indicator for its calculation is the volume of MSW.

However, the existing amount of funding does not allow the introduction of new technologies (RDF fuel, incineration, composting). The practice of financing individual MSW management projects out of budget funds did not justify itself, whereas the low level of tariffs for MSW management did not allow attracting both foreign and domestic investments.

In this regard, the imposition of the special MSW landfill fee is the best possible way compliant with international practices. The aforementioned fee is included in MSW management tariffs with respect to waste producers (population, legal entities).

Such an approach will motivate MSW management operators to reduce the proportion of MSW landfill. Saving on waste landfill will enable, on the one hand, to finance MSW management activities, while, on the other hand, the special waste landfill fee will become a reliable source of financing aimed at constructing and remediating landfills. The special waste landfill fee can be imposed after 2020, which entirely corresponds to the programme of the Government of the Republic of Belarus on full reimbursement of the costs of public utilities by the population by 2020.

According to calculations, the size of such a fee should range from 4.4 to 8.8 roubles per 1 cubic meter (from 2 to 4 euros per 1 cubic meter). In calculations of investment volumes (Table 3 of Annex 2 hereto), a fee of 4.4 roubles per 1 cubic meter was taken (2 euros per 1 cubic meter).

The type of the special waste landfill fee, its size, terms, stages of imposition, as well as mechanisms for administering its collection and spending (budget, non-budgetary funds, the operator's fund, etc.) should be determined after implementing activities aimed at developing regional programmes on landfills, transfer stations, the collection infrastructure, the modernization of the container system and transport fleet with regard to its impact on payments for housing and public utilities by the population.

### Stage 3 (2026 – 2035)

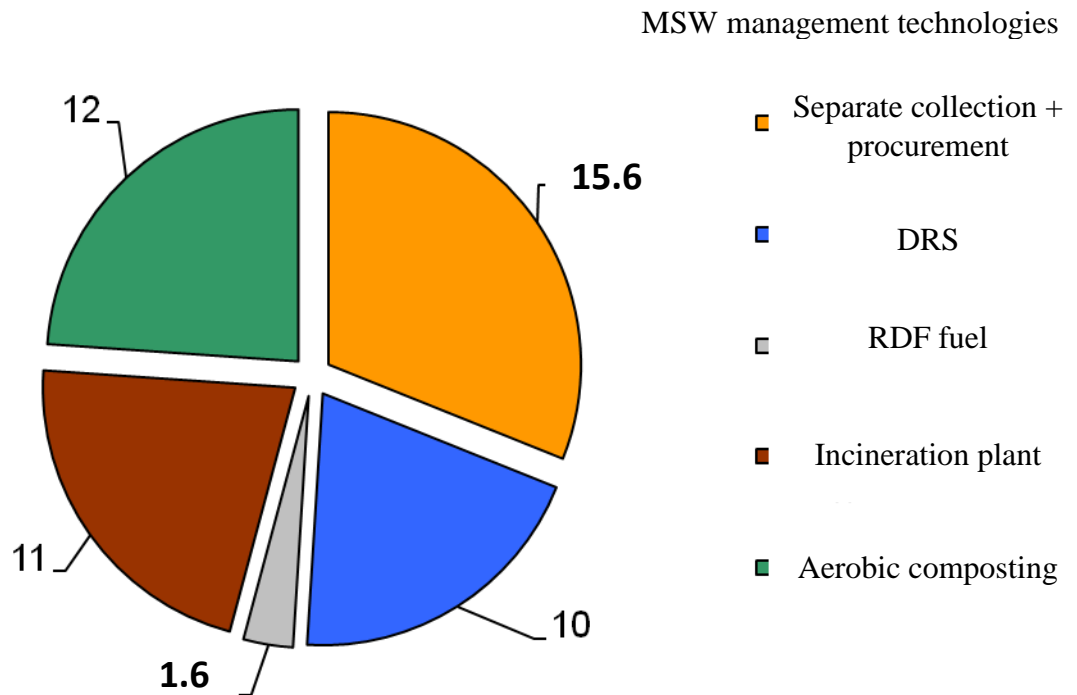
The peculiarity of this decade is as follows: on condition that DRS is introduced and the incineration plant in Minsk is under construction, there is a technological need for the reconstruction and replacement of equipment, which is estimated at 30 million euros with respect to DRS and 100 million euros with respect to the plant.

Moreover, the introduction of the aerobic composting technology in large towns (20 towns) is scheduled for this period, which will increase the use of MSW by at least 10 per cent due to the use of biological waste as a structural material for waste landfill.

Figure 8 shows the level of MSW use in the total volume of waste generation in line with the main technological solutions.



**The Level of MSW Use in the Total Volume  
of Waste Generation, %**



**The aggregated level of MSW use in the overall volume of waste generation makes up 50.2%**

Figure 8. The Share of MSW Technologies in the Total Volume of Waste Generation (Draft).

The main indicators of the National Strategy as well as the size of investments and specific indicators of costs of implementing the activities of the National Strategy are shown in Table 4.

Table 4

## Major Indicators of the National Strategy

Indicator	Unit of measurement	Initial Situation as of 2006 – 2015	For 2017 – 2020				For 2021 – 2025					For 2026 – 2035				
			Module 1	Module 2	Module 3	Total	Module 1	Module 2	Module 3	Module 5	Total	Module 1	Module 2	Module 5	Module 3 + Module 4	Total
1. Level of Use in % Total Volume of Waste Generation		5.4 – 15.6	whole period – 15.6 – 26.4				whole period – 26.4 – 37.4					whole period – 37.4 – 50.2				
			15.6	10	0.8	26.4	15.6	10	0.8	11	37.4	15.6	10	11	13.6	50.2
2. Investments	million EUR	214.3	170.6 – 183.3	85.5 – 100.5	8.6 – 9.6	263.7 – 291.4	174.3 – 190.1	–	–	200	374.3 – 390.1	368.8 – 400.3	30	100	49.2 – 50.2	548 – 580.5
	EUR/ton	8.5	11.7 – 12.6	5.8 – 6.9	0.6 – 0.65	18.1 – 20.15	9.5 – 10.4	–	–	10.9	20.4 – 21.3	10.1 – 11.0	0.8	2.7	1.4	15.0 – 15.9
3. Operating costs	million EUR	629.7*	417.2	101	10.4	528.6	521.5	252.5	12.8	150	936.5	1,043	505	300	167.3	2,015.3
	EUR/ton	25.3	28.6	13.8	0.7	43.1	28.6	13.8	0.7	8.2	51.3	28.6	13.8	8.2	4.6	55.2
4. Total Costs	million EUR	844.0	587.8 – 600.5	186.5 – 201.5	19.0 – 20.0	793.3 – 821.9	695.8 – 711.6	252.5	12.8	350	1,311.1 – 1,326.9	1,411.8 – 1,443.3	535	400	216.5 – 217.5	2,563.3 – 2,595.8
	EUR/ton	33.5	40.3 – 41.2	19.6 – 20.7	1.3 – 1.4	61.2 – 63.2	38.1 – 39	13.8	0.35	19.1	71.35 – 72.25	38.7 – 39.6	14.6	10.9	6.0	70.2 – 71.1

\* Compensation and other payments included.

## The Evaluation of Financial Sustainability of the MSW and SMR Management System

A sustainable financial system in the MSW and SMR management is based on ensuring full cost recovery for the services provided for the collection, removal, sorting, use and landfill of MSW.

Financial stability is underpinned by:

MSW management tariffs imposed by local executive and regulatory bodies in accordance with substantiated costs and additional profits on an annual basis. Tariffs should be imposed on the population with due account for the change in income and should not exceed the threshold of availability of waste management services;

income from the sale of products (secondary raw materials, RDF fuel, electric and heat energy, biogas, compost, etc.);

funds of producers and suppliers of goods and packaging having a negative impact on the environment after the loss of their consumer properties.

Figure 9 and Figure 10 show an assessment of the dynamics of changes in investment and operating costs and sources of financing in absolute terms, as well as specific indicators per one ton of MSW. The calculations were made with regard to the costs of introducing DRS and with no account for its impact on the total costs of the MSW management system.

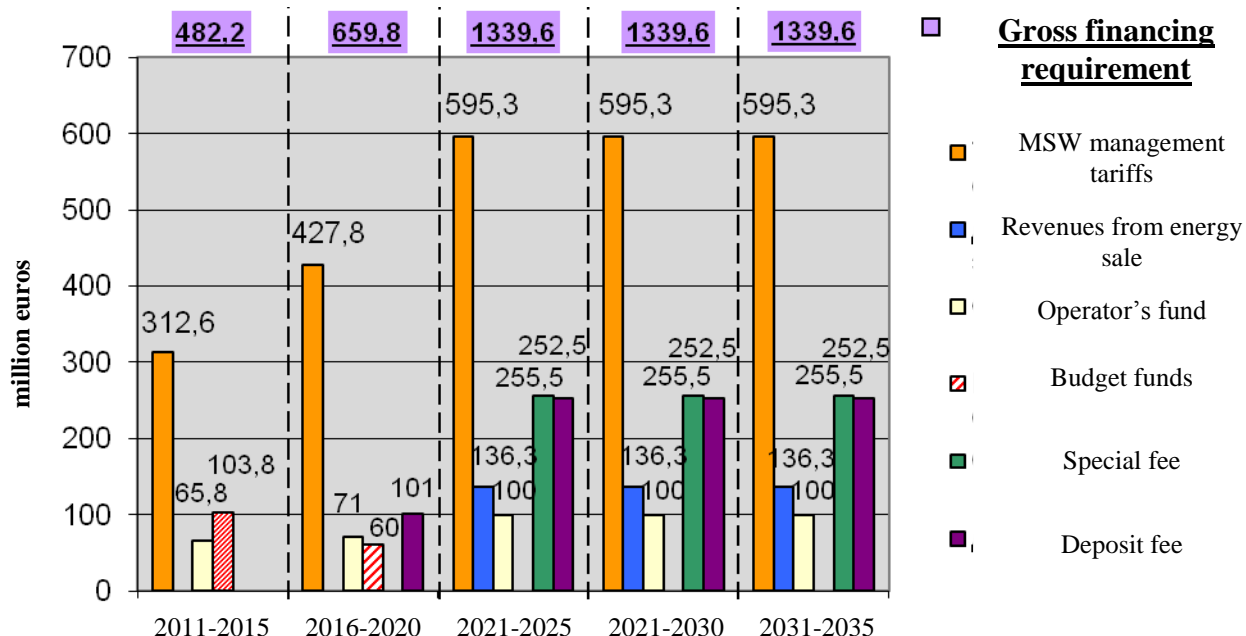


Figure 9. Sources of Costs Financing (Draft).

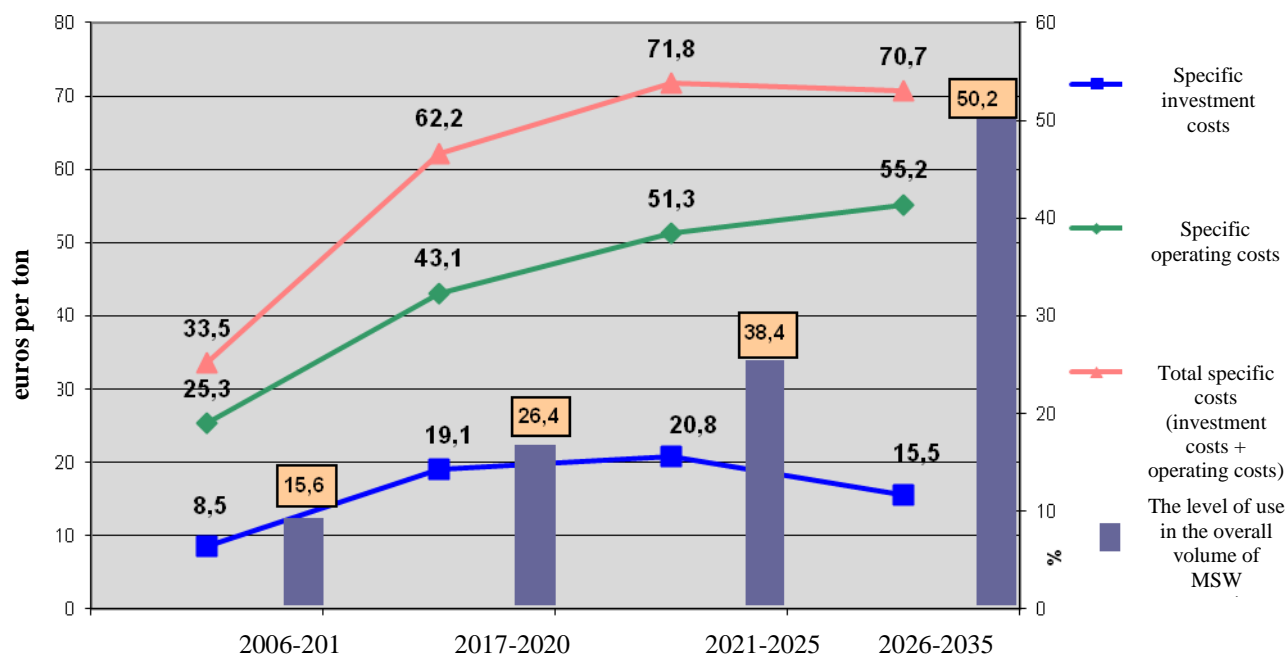


Figure 10. Specific MSW Management Costs Depending on the Level of Use (Draft).

The National Strategy stipulates that on condition that a special waste landfill fee is imposed, the real MSW management tariff applicable to the population will increase by the amount of the waste landfill fee to make up 40-42 euros per ton, provided it is adjusted to the annual inflation rate.

For comparison, in Poland the MSW management tariff for the population depends on the municipality and ranges from 60 to 120 euros per ton on average, and in Germany it makes up from 100 to 400 euros per ton. If we compare the ratio of MSW management costs to the average monthly wages (after taxes and deductions), in Germany this ratio accounts for 0.6 percent, while in the Republic of Belarus it amounts to 0.19 percent at current tariffs (Table 5). With reference to the tariffs stipulated by the National Strategy, the ratio will make up 0.24 percent, which will not significantly affect the level of expenditures of the population.

In accordance with international practices, the threshold of accessibility of the waste management service for the population amounts to 1 percent of the average income.

Ratio of MSW Management Costs and the Average Wages

Indicators	Germany	Poland	Belarus (2016)	Belarus (2017 – 2035)
Average Wages after Taxes and Deductions	1500 euros	940 euros	310 euros	450 euros
Average Monthly MSW Management Fee per capita	10 euros	2.4 euros	0.58 euros	1.08 euros
Share of the MSW Management Fee in the Wages	0.66 per cent	0.26 per cent	0.19 per cent	0.24 per cent

## **CHAPTER 8 MONITORING OF THE NATIONAL STRATEGY IMPLEMENTATION**

The annual monitoring of the National Strategy implementation is aimed at facilitating the implementation of activities, achieving key indicators, and adjusting the indicators, when external or internal conditions of socio-economic development of Belarus undergo changes.

Based on the monitoring results, an analytical report on the implementation of the National Strategy is prepared.

Within their authority, state bodies and other organizations take part in monitoring the implementation of the National Strategy and preparing analytical reports.

The Ministry of Housing and Communal Services is responsible for preparing a report on the implementation of measures and achieving target parameters and determines the procedures, form and terms of the provision of information aiming to ensure unity of information.

To prepare an analytical report, the Ministry has the right to request additional information and to engage specialists from other ministries and state bodies, educational and scientific institutions, as well as from among representatives of business circles and environmental initiatives.

The monitoring results forming the basis for making decisions on improving the MSW and SMR management system as well as adjusting, if necessary, the main indicators of the National Strategy are reported to the Deputy Prime Minister of the Republic of Belarus.

Based on the monitoring results, the Deputy Prime Minister approves the plan of the main measures for the implementation of the National Strategy for 1 to 2 years.

The analytical report on the implementation of the National Strategy is published and available to the general public.

The National Strategy is subject to planned adjustments based on the results of the analysis of its implementation for the period from 2017 to 2025.

Annex 1  
to the National Strategy for the Management  
of Municipal Solid Waste and Secondary  
Material Resources in the Republic of Belarus  
for the Period up to 2035

## DEFINITIONS

of the National Strategy for the Management of  
Municipal Solid Waste and Secondary Material  
Resources in the Republic of Belarus for the  
Period up to 2035

The National Strategy for the Management of Municipal Solid Waste and Secondary Material Resources in the Republic of Belarus for the Period up to 2035 applies the following concepts and definitions:

secondary raw materials shall mean secondary material resources, which are prepared for the use in manufacturing of products, production of electrical and / or thermal energy, performance of work, provision of services in accordance with the requirements established by technical regulations;

secondary material resources (SMR) shall mean waste, which can be used in economy as secondary raw materials after collection and for the use of which there are special facilities;

deposit system of disposable consumer package management (DRS) shall mean a system for collecting beverage packaging, according to which the consumer pays a deposit for the package, when purchasing goods, and gets it back in the event of delivery of used packaging in certain places;

deposit package shall mean a package included in DRS;

pollution of the environment shall mean the penetration of a substance, physical factors (energy, noise, radiation and other factors), microorganisms, properties, location or number of which lead to negative changes in physical, chemical, biological and other indicators of the environment state, including the exceeding of standards in the field of environmental protection, into the components of the natural environment, their presence and (or) occurrence therein, as a result of some harmful effect on the environment;

waste landfill shall mean waste isolation at waste landfill facilities aimed at preventing harmful effects of waste products, interaction and (or) decomposition products on the environment, health of citizens, property owned by the state, property of legal entities and individuals (hereinafter referred to as the 'property'), which does not provide opportunities for their further use;

use of waste shall mean the use of waste products for production, energy, work, and services;

municipal waste shall mean consumption waste and production waste included in the list of waste related to municipal waste approved by the Ministry of Housing and Communal Services, the removal of which is organized by local executive and administrative bodies;

places of temporary storage of waste shall mean special equipment (containers, bins, etc.), sites and other places intended for temporary storage of waste;

waste neutralization shall mean activities aimed at recycling, incineration or destruction of waste in another way, including activities aimed at reducing the volume of waste and (or) eliminating its hazardous properties (with the exception of waste landfill), and not related to its use;

waste management shall mean activities related to waste generation, waste collection, separation of waste by type, waste disposal, storage, landfill, transportation, neutralization, use and (or) preparation for use;

waste landfill facilities shall mean landfills and other structures intended for landfill of waste;

disposable consumer packaging shall mean a consumer package used as a package once because of its technical and strength properties, or because of regulatory restrictions or the packer's commercial choice;

waste shall mean substances or objects generated during an economic activity or human activity and not having a specific purpose at the place of its generation or having lost all or part of its consumer properties;

production waste shall mean waste generated during the implementation of economic activities by legal entities and self-employed entrepreneurs (manufacturing of products, production of energy, performance of work, provision of services), by-products and related products of mining and mineral processing;

consumption waste shall mean waste generated in the process of a human activity and not related to the implementation of an economic activity, waste generated in consumer cooperatives and horticultural partnerships, as well as sweepings generated on public land;

transportation of waste shall mean the delivery of waste by vehicles on a contractual basis or on other legal grounds;

consumer shall mean a legal entity or an individual using consumer packaging as intended;

consumer package shall mean a package intended for primary packaging and sale of products to the end user;

waste producer shall mean a legal entity, self-employed entrepreneur and an individual, whose economic or life activities lead to waste generation;

RDF fuel shall mean a solid fuel made from MSW residues after extracting fine fractions of up to 80 millimeters in size of organic matter and



incombustible constituents, as well as after extracting the main types of SMR which are of greatest value from the point of view of their further realization, intended for energy generation, and characteristics of which are determined according to the current standards or technical specifications of the fuel producer;

separate collection of waste shall mean the technological process of waste collection providing for disposal of waste by types in separate containers or other process vessels directly from sources of generation of such waste and preparing it for reuse in accordance with technical requirements;

waste collection shall mean waste concentration activities in temporary waste storage areas for subsequent removal;

municipal solid waste (MSW) shall mean municipal waste, which is in a solid aggregate state (consisting mainly of solids (materials) and (or) objects (products));

waste removal shall mean activities related to the temporary storage of waste and its transportation to waste storage, landfill, disposal and (or) utilization facilities;

waste recording shall mean a system of continuous documentary reflection of information on quantitative and qualitative indicators of waste as well as on waste management;

waste storage shall mean keeping of waste in places of temporary waste storage, at waste storage facilities prior to its transportation to landfill sites, waste neutralization sites and (or) to facilities for the use of waste.

Annex 2  
to the National Strategy for the Management  
of Municipal Solid Waste and Secondary  
Material Resources in the Republic of Belarus  
for the Period up to 2035

## INVESTMENT PLAN

of the National Strategy for the Management of  
Municipal Solid Waste and Secondary Material  
Resources in the Republic of Belarus for the  
Period up to 2035

Table 1

Assessment of the volume of investments in  
improving the infrastructure and the system for MSW  
and SMR collection (Module 1)

(million roubles /million euros)

Major investment priorities	Size of investment	Average annual investment
Modernization and upgrading of the waste truck fleet	230.4/104.7	12.1/5.51
Equipment of the MSW and SMR system with containers	327.4/148.8	17.23/7.83
Construction and reconstruction of container sites	18/8.2	0.95/0.43
Remediation of landfills	176/80	9.26/4.21
Construction of new landfills	638.1 – 770.2/ 290 – 350	33.7 – 40.5/ 15.3 – 18.4
Creation of transfer stations	180.4/82	9.5/4.3
<b>Total</b>	<b>1,570.5 – 1,702.5/ 713.7 – 773.7</b>	<b>82.5 – 89.6/ 37.5 – 40.7</b>

Table 2

## Assessment of the volume of investments in DRS (Module 2)

(million roubles /million euros)

Major investment priorities	Size of investment
1. Establishment of a management body:	5.5/2.5
1.1. development and maintenance of the information management system	2.86/1.3
1.2. financing of the organizational structure (personnel, vehicles, computer equipment, preparatory activities)	2.64/1.2
2. Purchase of process equipment (reverse vending machines)	77 – 88/35 – 40
3. Development of collection infrastructure (calculation centres, warehouses, transport, logistics, process equipment, production facilities for equipment)	22 – 44/10 – 20
4. Financing of expenses of industry and importers, trade (a credit line for the current financing of deposit payments, payments for the organization of deposit packaging collection, servicing of reverse vending machines, etc.), including:	83.6/38
4.1. financing of deposit fees return to trade organizations at the initial stage (1-2 months)	30.8/14
4.2. working capital of trade organizations in the amount up to the moment of repayment of the CDS (from 1 to 2 months) of deposit payments to trade organizations	22/10
4.3. financing at the initial stage of waste management fees	7.7/3.5
4.4. Other costs (leasing of reverse vending machines, production areas for such machines, maintenance, staff wages, electricity, administrative expenses)	23.1/10.5
Total	188.1 – 221.2/ 85.5 – 100.5

Table 3

## Sources of investments and operating costs in the National Strategy

(million euros)

Major investment priorities	Total	Including by sources of financing						
		Tariffs for consumers	energy tariff	operator's fund	local budget (of the region, district)	waste landfill fee*	deposit fees	investments, bank loans
Module 1. Improvement of the MSW and SMR infrastructure and collection system								
1. Upgrading and renovation of the waste truck fleet	104.7	–	–	73.3	–	31.4	–	–
2. Equipment of the MSW and SMR system with containers	148,8	–	–	102.6	–	46.2	–	–
3. Construction and reconstruction of container sites	8.2	8.2	–	–	–	–	–	–
4. Remediation of landfills	80	–	–	–	–	80	–	–
5. Construction of new landfills	290 – 350	–	–	–	–	290 – 350	–	–
6. Transfer stations and sorting equipment	82	–	–	–	–	82	–	–

(million euros)

Major investment priorities	Total	Including by sources of financing						
		Tariffs for consumers	energy tariff	operator's fund	local budget (of the region, district)	waste landfill fee*	deposit fees	investments, bank loans
7. Operating costs	1,981.7	1,981.7	–	–	–	–	–	–
Subtotal	2,695.4 – 2,755.4	1,989.9		175.9	–	529.6 – 589.6	–	–
Module 2. DRS								
8. Introduction (preparatory stage)	2.5	–	–	2.5	–	–	–	–
9. Investments in process (reverse vending machines)	35 – 40	–	–	–	–	–	35 – 40	direct investments, 35 – 40
10. Depreciation deductions (reverse vending machines)	30	–	–	–	–	–	30	direct investments, 30
11. Investments in the waste collection infrastructure (calculation centres, warehouses, transport,	10 – 20	–	–	–	–	–	10 – 20	direct investments, 10 – 20

(million euros)

Major investment priorities	Total	Including by sources of financing						
		Tariffs for consumers	energy tariff	operator's fund	local budget (of the region, district)	waste landfill fee*	deposit fees	investments, bank loans
logistics, equipment)								
12. Financial costs of industry, importers and trade (working capital)	38	–	–	–	–	–	38	banks of the Republic of Belarus (credit lines), 38
13. Operating costs	857.5	–	–	–	–	–	857.5	
<b>Total</b>	<b>974 – 989</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>971.5 – 986.5</b>	
Module 3. MSW energy recovery (RDF fuel production)								
14. Investments	17.2 – 19.2	–	–	10	–	7.2 – 9.2	–	–
15. Operating costs	81	–	–	81	–	–	–	–
<b>Total</b>	<b>98.2 – 100.2</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>7.2 – 9.2</b>	<b>–</b>	<b>–</b>
Module 4. Aerobic composting of biological waste								
16. Investments	40.6	–	–	40.6	–	–	–	–
17. Operating costs	109.5	–	–	–	–	109.5	–	–

(million euros)

Major investment priorities	Total	Including by sources of financing						
		Tariffs for consumers	energy tariff	operator's fund	local budget (of the region, district)	waste landfill fee*	deposit fees	investments, bank loans
Total	150.1	–	–	–	–	109.5	–	–
Module 5. MSW energy recovery (waste incineration plant in Minsk)								
18. Investments	300	65	235	–	–	–	–	direct investments, 300
19. Operating costs**	450	150	174	–	–	126	–	–
Subtotal	750	215	409	–	–	126	–	–
Total	4,667.7 – 4,744.7	2204,9	409	310	–	772.3 – 834.3	971.5 – 986.5	–

\* Waste landfill fee – calculated as 2 euros/m<sup>3</sup> (14 euros per ton).

\*\* MSW disposal tariff – 60 euros per ton.