REPUBLIC OF BELARUS

BELARUS INTEGRATED SOLID WASTE MANAGEMENT PROJECT

Component I: Mechanical Waste Separation Facility in the City of Grodno

Environmental Impact Assessment

Executive Summary

Minsk

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EXECUTIVE SUMMARY

Introduction

Solid waste management is an important problem and priority in urban areas in many countries. This is the case in Belarus where cities are facing increasing quantities of solid waste generated from varied residential, commercial and industrial sources. While most cities in Belarus provide generally effective core collection and disposal services, the national policy defined in the Law “On Waste Management” (2008) directs that a greater emphasis needs to be placed on the recovery of materials and energy from solid waste streams provided that environmental requirements are met and that economic efficiency considerations are also taken into account. Although solid waste component source separation and capture for recycling in Belarus has been limited to date, the country is advancing the National Program for Municipal Solid Waste Management that also seeks to increase the level of source separation and independent collection of separated materials (such as paper, plastic and metal) to increase the recycling rate throughout the country. This direction is consistent with sound practice throughout the world where much is being done to divert solid waste components from disposal facilities thereby increasing their life expectancy and decreasing their potential environmental impacts.

Three methods of municipal solid waste collection is currently employed in Grodno, the location of the subject proposed Bank-financed project: container (78%), manual (14%) and apartment-level collection (8%). There are 165 container grounds arranged in the multi-storey housing area, 64 in individual houses area and 261 on the territory of garage cooperatives. There are 72 industrial enterprises in the city which also collect waste in containers. As of 1 October 2009, a total of 9,774 contracts for municipal solid waste removal were concluded. 34 route charts have been prepared for 41 refuse trucks for waste transportation to the municipal solid waste landfill. About 3,347 thousand m³ of waste were deposited in the city landfill during January 2005 – September 2009.

Proposed Project Objective

The main development objective of the project is to improve environmental benefits of integrated solid waste management in Grodno through recovery and reuse of recyclable materials in line with good international standards. The objective will be achieved by reducing the volume of waste that is disposed in landfills and reusing valuable recycled materials efficiently. The project will support important elements of Grodno’s Integrated Solid Waste Management Program.

Project Description and Location

The proposed project will consist of components that will cover investments targeting the construction of a mechanical waste separation facility (MWSF) in Grodno (located at Rogachi-Vyselki municipal waste disposal landfill); improvements to solid waste management in Grodno including provision of equipment for the collection and separation of waste at source; and project management. Details of project components are given below:
Mechanical Waste Separation Facility in the City of Grodno. The estimated cost of the component is about US$ 37 million which is to be financed by the Bank’s loan. Funds will finance the construction of a 120,000 ton/year modern mechanical separation plant for mixed household waste to recover recyclable materials. The objectives of this component are to: (a) reduce the amount of deposited waste; (b) recycle, extract and reuse valuable materials (plastics, waste paper, metals, glass, and possibly other materials); and (c) increase landfill service life. The component includes activities for the design and supervision; construction, procurement and installation of equipment; and support to start-up the operation of the plant, production of materials, and marketing thereof. The Government of Belarus has selected the landfill site for the construction of this facility. This component will have environmental benefits as reflected in reduced waste in landfills – in line with the government’s regulations, utilizing materials of value, reducing the need for controversial new landfills in the future.

Waste management Improvements: The estimated cost of this component is $4.0 million to be financed by the Government. This component will include a review of the current logistics for the collection of separated waste, and provide equipment for the collection of separated waste. Equipment will include trucks to replace about 10 fully depreciated trucks and about 2,500 containers to supplement Grodno’s program to increase coverage of collection of source separated material. An important part of this component is a public information and awareness raising campaign to inform the population about the importance of their participation to the success of the project. Public participation in recycling program has internationally been proven to have a direct impact on the success of any technical solution in this area. This program is included in the State Program for Recyclable Materials Collection and Processing 2009-2015, dated June 29, 2009.

Project Management and other Support Activities: The estimated cost of this component is estimated at US$ 3.65 million of which the Bank will finance $0.65 million for project audit, monitoring/evaluation, and training.

Municipal solid waste mechanical separation technology includes the following steps:

- weighting of a refuse truck delivering waste
- waste unloading from a refuse truck in the receipt section of the production building
- preliminary separation of coarse fraction
- waste delivery onto a transporting conveyor
- manual initial separation to remove glass and other hazardous components
- sifting at two-sieves unit to sort out fine fraction of residual and fine fraction of alternative fuel
- manual separation of waste coarse fraction after sifting to sort out materials of value (secondary materials)
- grinding of waste left on a transporter in a primary grinder
- separation of grinded waste in a vibrating sieve and a separator into residual and alternative fuel;
- final grinding of alternative fuel left on a transporter
- bailing of alternative fuel and secondary materials
• transportation of alternative fuel and secondary materials to customers; transportation of residual to waste disposal landfill

**Social and Economic Situation in Project Area (Grodno)**

The Grodno Oblast has a population of 1,150,000, of which about 330,000 reside in the oblast capital of Grodno city (Grodno). The City shares borders with Lithuania and Poland. The dominating industrial sectors are food processing (26.9%), chemical and petroleum products (22.6%), machine building and metalworking (15.3%), construction materials (9%), forestry, wood processing and pulp and paper (7.1%), power generation (5.2%), light industry (4.8%), and fuel (0.3%). Annual growth of industrial production amounts at 11% on the average. The number of employed in the industrial sector exceeds 100,000 or 25.3% of the work force. Accordingly, unemployment is low. Average household monthly wage is about BYR 1 million slightly higher than the average for Belarus. The city has a well established solid waste management with 100% collection coverage. The current landfill Rogachi-Vyselki has an area of 19.6 hectares, and has been in use for 20 years. It received 159,200 tons of waste in 2008. The remaining life of the landfill is about 10 years and with a tonnage capacity of about 1.63 million tons. The landfill is equipped with a weighbridge, waste is compacted, and leachate is recirculated into the solid waste accumulation in the landfill. Overall waste management is efficient and effective as reflected in a clean city and well operating landfill.

In essence the SWM system in Grodno provides the necessary requirements for maintaining healthy conditions through good waste collection service, and for protecting the city environment during the waste treatment and disposal stages. Given this situation, the Grodno city is now keen to move up the ladder in integrated SWM technology and aims to enhance resource management through high rates of reuse and recycling. The city has initiated a recycling program which remains in early stages. About 50% of the City is provided with containers for separate recycling, but it appears that awareness and participation by the population are at lower levels. The City recognizes the potential value both economically and environmentally of improving solid waste separation and the reuse of collected valuable material.

**Baseline Environmental Conditions in the Project Area**

The city of Grodno is located in the western part of Belarus upstream the Niemen river. The proposed facility will be located in the western suburb of Grodno at the existing landfill site. The closest residential settlement (Tumashi) is located 600 meters eastwards from the facility’s site while the Podiatly village is 600 meters northwards.

The main air pollution sources in Grodno are energy sector companies, mineral fertilizers and construction materials and transport vehicles. In 2007, emissions from stationary sources in Grodno totaled 12.0 thousand tons. Emissions decreased by 1.72 thousand tons versus 2006. Maximum allowable concentration (MAC) is exceeded for nitrogen dioxide (1.04 MAC), ammonia (1.575 MAC) and formaldehyde (3.40 MAC). Concentration of other air pollutants is within the established norms.
The prevailing soils in the Grodno Oblast are sod-podzol soils. Sod heavy and medium-podzol loam and pulverescent soils prevail at moraine uplands; boggy sod-podzol soils can be found in lowlands. Large areas of alluvial-meadow soils characterized by considerable humus content are found in the Niemen valley.

Grodno and the Grodno Oblast are dominated by sod medium-podzol boulder-loam soils with low content of humus, absorbed beds and phosphoric acid which is easily accessible for plants thus underlying the need for mineral and organic fertilizers.

The river network of the Grodno region belongs to the Baltic Sea basin. The main rivers are Niemen, Schara, Molchad, Berezina, Ross, Kotra and Ditva. Lakes are generally small. The most important water asset of the project area is the Niemen river. The Niemen river ranks fifth among Belarus' rivers by watershed area (the total area is 98200 km², within Belarus - 35000 km²) and water content (9 km³/year).

Surface and ground water resources are sufficient to meet water demand. River feeding is mixed. In early spring rivers are fed by melt waters, in winter by ground waters, and in summer and autumn by precipitation and ground waters. Quality of ground waters in the main water bearing horizons meets the sanitary and epidemiological requirements.

Vegetation cover in the Grodno Oblast is formed by forests, meadows, shrubs and bogs. The Oblast has scarce forest areas relative to other regions of the country. Forests occupy 30% of the territory and are distributed unevenly. The largest forest areas are located mainly in the Niemen lowland, in the Pribug Plain and the Oshmiany Highland in the southern part of the Oblast. There are no protected vegetation species in the vicinity of the proposed facility.

Wildlife of the surveyed project region is fairly diverse. The territories of the Ostrovets and the Slonim forestry enterprises are inhabited by deer, elk, boar, roe, wolf, hare, squirrel, hazel grouse and black grouse. The banks of the rivers are habitats of otter, muskrat, mink, beaver, wild duck and diving duck. There are no protected fauna species in the vicinity of the proposed project site.

Project Relevant Legal Framework

The 1994 Constitution of the Republic of Belarus (Articles 34, 46, 55) and the Law on Environmental Protection dated 26 November 1992 №1982-XII (amended on dated 13 June 2007 №238-3) are the fundamental laws establishing a legal basis for environmental protection and management, conservation and restoration of biodiversity, natural resources and assets and are intended to secure statutory rights of citizens to life- and health-friendly environment.

The Law on Waste Management dated 20 July 2007 №271-3 established a legal basis for waste management. The Law is intended to reduce waste generation, to prevent harmful impact on the environment, public health, state-owned assets, corporate and individual property and to maximize reuse of recycled materials. As a follow-up to the Law on Waste Management, the Ministry of Natural Resources and Environmental Protection, the Ministry of Housing and Utilities and the Council of Ministers of the Republic of Belarus have adopted a number of
secondary regulatory acts. These laws and regulations have been followed in decision-making on designing the proposed facility, selection of the site and waste processing technology.

Environmental Impact Assessment is performed based on the Instruction on the procedure of environmental impact assessment of intended economic and other activity in the Republic of Belarus endorsed by the Resolution of the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus dated 17 June 2005 №30.

Public consultations are organized in accordance with the following regulations:

- The Constitution of the Republic of Belarus
- The Aarhus Convention (Presidential Decree dated 14 December 1999 №726)
- The Law on republican and local assemblies
- The Law on citizens' appeals
- The Law on local governance and self-governance
- The Law on architectural, urban construction and construction activity in the Republic of Belarus


**Project Alternatives**

**No Project.** Under “No Project” option, impacts would include:

- non-separation of waste prior to disposal in the existing landfill would entail considerable loss of secondary materials and, consequently, would require additional natural resources for production of paper, plastic, metal and etc.
- rapid filling of the existing municipal landfill with non-separated MSW would require further expansion of the landfill and, consequently, acquisition of additional land areas thus resulting in expansion of the area of environmental impact produced by the landfill.

A source separated collection of municipal solid waste has been employed in developed economies in the recent decades. It allows to: (i) maximize utilization (up to 20-25%) of the materials of value (waste paper, glass, scrap metals, textiles, plastics); and (ii) avoid accumulation of heavy metals in wastes already at the stage of waste selection at the household level.
From the environmental protection standpoint, this method allows to partially decontaminate the waste stream already at the first stage of waste management, i.e. to avoid accumulation of heavy metal salts in the organic fraction. In terms of cost-efficiency, recovery of up to 20% of secondary materials from 1 ton of municipal solid waste increases profits of a utility company by USD 7.5.

**Thermal MSW decomposition (incineration)** with or without utilization of exhaust gases, is widely used throughout the world. Incineration has become the first technical option widely used in the world. Countries with relatively small land area and high population density were the first ones which started to introduce MSW incineration facilities.

The many years of experience allow to clearly articulate strengths and weaknesses of waste incineration. The strengths are: (i) manifold reduction of the volume of waste (approximately by 10 times); (ii) reduction of waste transportation costs; (iii) heat recuperation (incineration of 5 tons of MSW is equivalent to 1 ton of fuel equivalent); and (iv) reduction of the risk of soil and water contamination (relative sterilization of material is ensured at 1000°C). Weaknesses are also obvious: (i) high relative capital intensity of construction (7-15 times higher than with the bio-mechanical treatment); (ii) irreversible loss (destruction) of valuable recyclable materials; (iii) low efficiency of ferrous metals recovery from sludge; (iv) high output of ashes from sludge (over 30% by mass); and (v) air contamination with multiple pollutants.

In case of incineration, emissions of heavy metals, chlorinated organic compounds, hydrogen chloride and fluoride with smoke and dust, require complicated and expensive response. Environmental contamination by dioxin causing pathologies in newborns as well as various tumors represents a particular hazard.

Since municipal waste incineration is associated with hazardous emissions, the countries where this technique has long been practiced make considerable efforts aimed at neutralization and capture of pollutants, as well as establishment of environmental monitoring systems. Due to weaknesses of waste incineration i.e. without preliminary separation and treatment, this technique has been increasingly rejected in the last two decades in Belarus.

**Municipal waste disposal in landfills** has been the prevailing method of addressing the problem of waste in Belarus and CIS countries. This method has its strengths and weaknesses. Establishment of MSW landfills requires acquisition of significant land plots, expenditures on ground water protection measures (arrangement of expensive hydro-protective foundation layers, etc.) and high operation and transportation costs. The method is not environmentally sound. Landfills are a source of odors, they are potentially fire and infection hazardous, they entail a risk of ground water contamination with poisonous filtrate, since even the regulated landfills are not adequately maintained. Landfill gas utilization should also be addressed. At the same time, however, MSW disposal in landfills is technologically simple and remains the main method of addressing waste disposal problems both in rural area and small residential settlements (up to 10 thousand residents).

**Biological treatment of municipal solid waste** following separation and mechanical treatment is the most progressive method and allows to minimize the amount of waste being disposed in
the existing landfills because the residual of biomechanical treatment is an inert material which does not contain biologically active substances and can be disposed in landfills; to reuse considerable amount of materials of value (metals, plastic, glass, waste paper, textiles and etc.); to decrease the number of vehicles required for transportation of secondary materials to the point of use due to prior compressing of source separated materials; to get organic waste fraction which can be then used as nonconventional (alternative) fuel; to produce heat and electric energy from combusting a biogas which is a product of anaerobic digestion of MSW; to get concentrated solution of ammonium sulphate which is used as a fertilizer in the agricultural sector. However, this method remains the most expensive.

**Alternative project site locations.** An alternative to locating the facility at the municipal solid waste disposal landfill site is to locate it in the industrial estate. This option addresses engineering infrastructure issues (water supply, sanitation, heating, power supply and etc.) in a more cost-efficient manner and, also, opens a possibility, in case biological treatment of waste, of the efficient use of energy produced from a biogas at the neighboring enterprises. At the same time, however, there are limitations in terms of the size of the facility’s site given its expansion in the future; additional expenditures on transportation of residual material that remains after mechanical separation of waste; additional movement of MSW in case of sudden shutdown of a waste processing plant; nuisance factors (visual, noise and etc.) due to small distance from the place of residence and work of households. In terms of impacts on air, water resources, soils, vegetation and wildlife, an alternative location of municipal waste separation facility in the industrial estate in Grodno is identical to a basic option of its location at the municipal solid waste landfill site.

**Conclusions of the analysis of alternatives.** Based on the above findings, it can be concluded that proposed waste disposal and utilization options are the most appropriate from environmental and economic considerations. Location options are identical from environmental viewpoint on condition all environmental protection measures specified in the Feasibility Study (2009) are implemented.

**Possible Project Environmental Impacts**

The MWSF will be located at the existing waste disposal landfill site (Rogachi-Vyselki). The analysis of the environment in the proposed facility location suggests that: (i) the surveyed area is suitable for the proposed solid waste management activities given the geo-hydrological characteristics (soil, air, water condition) of the surrounding environment and location outside the city; and (ii) the design of the facilities to be located within the surveyed area should provide for measures intended to limit emissions of air pollutants and to prevent considerable intake of pollutants by soils.

Environmental potential impacts during construction are temporary and mostly related to: (i) dust from construction activities and traffic-related air quality impacts; (ii) sewage disposal and drainage; (iii) noise from construction activities and vehicular movements; (iv) soil contamination and effects on groundwater; and (v) effects on workers’ health. These short-term environmental impacts are likely to be localized and efficiently mitigated by applying good international construction practice and planning.
Long term impacts such as odor generation and effects on air quality and noise emissions are expected during the operation phase of the newly constructed sorting facility. To avoid such impacts, the operator will be instructed to perform regular monitoring of the facility in accordance with a comprehensive monitoring system for supervision and control of air quality.

To minimize the negative impact of the proposed facility on the environment during operation, the design will ensure that the following activities are planned and implemented: (i) arrangement of gas scrubbing systems: dust-collecting filter for treatment of ventilation emissions from the production building, dust collectors 370Π16x0,5 and gas scrubbing units in the welding and mechanical sections; (ii) arrangement of hermetic collector for wastewaters collection; (iii) construction of industrial wastewater treatment plant; (iv) construction of rain waters treatment plant; (v) removal of topsoil prior to construction works and its further use for arrangement of lawns; and (v) site improvement and greening. Additionally, the contractor will be responsible to ensure implementation of the standard occupational health and safety measures during works.

**Environmental Management Plan**

The Project Environmental Management Plan outlines the mitigation, monitoring and institutional measures to be taken during the construction and operation of the mechanical waste separation facility to avoid potential adverse environmental impact as well as the actions, responsibilities and costs needed to implement these measures.

**Information Disclosure and Public Participation**

Two rounds of public consultations were held in the city of Grodno. The announcements of public consultations and the information on the proposed solid waste separation were published in the local printed and electronic media. The 1st round of public consultations on the draft EIA TOR took place on June 19, 2009 at the Grodno Municipality with about 8 people in attendance. The participants were interested in the choice of waste separation facility location and technology, the estimated length and cost of construction works, the investment payback period, the potential use of biogas, and expressed concern about the low level of consultations attendance.

The 2nd round of public consultations to discuss the EIA report, announced in the Grodno newspaper and on the web-site of Grodno municipality took place on August 19, 2009 and was attended by 124 people. Representatives of the local community and mass media and residents of the city took part in consultations. Among the questions asked were: (i) why the city does not have enough containers for source separation, (ii) could the glass factory provide guarantees of accepting source separated scrap glass, and (ii) does the country has adequate capacity for recycling of source separated waste.

**Conclusion**

Based on the findings of the Environmental Impact Assessment, it can be concluded that:
1. The envisaged method of municipal solid waste disposal is the most appropriate for the region from environmental and economic considerations. Atmospheric emissions from the proposed facility are expected to total 4.43 t/year (including 3.91 t/year from stationary sources and 0.52 t/year from mobile sources); contribution of the facility in the gross emissions in the city will be 0.04%.

2. Maximum and average annual ground level concentrations of pollutants in the residential area, at the border of the standard sanitary protection zone and outside the zone are much lower than the maximum allowable concentration (MAC). Area of influence of the proposed facility is within the radius of 500 meters (limited by an isoline of the concentration equaling 0.05 MAC for butyric acid).

3. Given that wastewater treatment facilities are envisaged in the design, the qualitative composition of industrial wastewaters meets the requirements applicable to wastewater discharges.

4. Environmental impact of physical factors is not expected to exceed the permissible level.

5. No air emissions and emergency wastewater discharges are anticipated.

The proposed facility is expected to produce a negligible impact on surface and ground waters, soils, vegetation, wildlife and human health. Based on the above findings, it can be concluded that operation of the proposed facility will not disturb natural-anthropogenic balance and, therefore, construction of the facility is feasible and desirable.