

# Comprehensive approach to solid waste disposal from urbanized territories

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**Abstract.** In this article the issue of need of using a system approach when cleaning garbage, from the urbanized territories is considered. The garbage problem in the urbanized territories is one of urgent ones for today. The most widely used ways of cleaning (destruction) of garbage is its burial in the grounds. As a result, big territories are occupied with such grounds and cannot be used, in addition, the impact on the environment is made. In the paper the use of a system approach, which consists in sorting of garbage at the stage of collecting municipal solid waste of the urbanized territories, creation of transport – logistic schemes on the transportation of garbage to the places of their necessary further processing, is offered. The system approach feature consists in the preliminary analysis of factors on the basis of which a more probable composition and volume of municipal solid waste is defined and the system of cleaning of municipal solid waste from the concrete urbanized territory is developed.

## 1. Introduction

In the course of an urbanization there is a saturation of industrial base, as a result saturation of infrastructure and the population. As a result not only load of the urbanized territories, but also of the environment increases [1,2]. As a result of increase and growth of the urbanized territory, and also its inhabitants, the quantity of the received garbage increases. One of urgent problems characteristic of many states is the problem of cleaning of garbage, to be exact its destruction after cleaning with the urbanized territories [3,4]. In the urbanized territories, it is possible to note two main sources of receipt of garbage [5]. It is garbage from industrial and manufacturing enterprises and the organization and household garbage from the main inhabitants of the urbanized territories. If garbage from the industrial enterprises it is possible to consider and form certain systems on waste recycling, due to creation of the kvazikorparativny enterprises. That with household garbage is harder and harder [6]. Formation of the system approach based on a package of measures for destruction of household garbage is necessary. This problem is aggravated with the made impact on the population and ecology of the urbanized environment and beyond its limits [7]. Influence happens in a consequence of violation of sanitary conditions of collecting municipal solid waste, as a result of formation of dumps and grounds of garbage to violation of conditions on operation and formation of places of burial [8].

For today the next ways of destruction of garbage are more actively used: processing, burning, burial. The safest is waste recycling. The last two ways are rather pernicious for the environment, and their negative impact can affect not only in the territory of the urbanized education where the garbage is burned or buried, but also on adjacent and even remote urbanized the territory since all natural



processes are interconnected also negative impact on the environment, affects in other places remote from an influence source. Taking into account the current legislation and normative documents only the decomposed garbage is subject to burial, but this requirement is not always observed, besides decomposition term at various products, can differ considerably. Preliminary sorting of garbage which will allow to increase efficiency of its further processing is necessary for decrease in negative impact.

The system of neutralization of municipal solid waste which developed in the Russian Federation is based on burial of the vast majority of waste on the organized dumps and grounds occupying the space more than 40 thousand hectares from which only about 8% meet health requirements. The others break a natural landscape and constitute considerable danger to the environment (are a source of pollution of the soil, underground ground waters and atmospheric air). About 50 thousand hectares are made by the area of already closed (filled) grounds.

Annually in our country about 200 million cubic meters of municipal solid waste, this number are formed, it is defined proceeding from norm of accumulation of municipal solid waste and population. Taking into account the number of the Russian Federation 146,8mln.chel and norm of accumulation of municipal solid waste of 1,56 CBM on the person. From which only about 7 million tons come back to economic circulation. Considering growth of the population, rates of an urbanization and the forecast of an indicator towards increase on accumulation of waste, it is necessary to take promptly measures for destruction, and reducing volumes and the areas burial of municipal solid waste and process burning as adverse way of processing of waste. According to standard and legislative documents use of the territory after burial of municipal solid waste is limited to various terms and opportunities depending on a class of danger of waste.

Thus, it is necessary to aspire to more effective ways of processing of municipal solid waste. The most perspective use of system approach to destruction of municipal solid waste from the urbanized territories seems [9].

## **2. The essence of the system approach for garbage collection from urbanized territories**

An integrated approach is actively used by Swedes [10], previously the garbage is sorted and then partially sent for processing, incineration plant. Due to combustion of municipal solid waste Swedes receive fuel for energy production and heat. Residual product makes about 25% of the initial weight of initial material. At this system, the main shortcoming is a release of toxic gases when burning the garbage demanding installation of the additional clearing and catching systems.

The system approach considered and offered to realization consists of several stages. The first stage of the system half-course on cleaning of garbage from the urbanized territories is the organization of collecting in places of their education. Collecting is made in the containers installed in the inhabited territory. The type and capacity of the applied containers depend on the number of the accumulated waste, like building and a way of loading and export of municipal solid waste. It is necessary to use sorting tanks, on various categories of garbage, depending on a possibility of their further processing or utilization, and from a class of their danger. Underground tanks for collecting garbage [11]. The garbage gets to a sorting tank is pressed, further under pressure and to the laid channels to go directly to the overworking plant, or to be taken out by cars [12]. The way of removal of garbage from a tank has to be defined by its possibility of further processing or, at impossibility of its processing or utilization. At the same time the main advantage of these tanks is economy of space, hygienic conditions of collecting garbage and energy efficiency as these tanks are supplied with filling sensors (in case of need garbage removal on the overworking plants). As addition when using individual systems of collecting utilization of garbage is possible use of systems on preliminary crushing and removal from territories on sewer drains. Due to introduction of the last systems increase in heat power potential of a deposit of sewage and further use of a deposit for obtaining energy is possible. As the main advantages of use of preliminary sorting and development of schemes of removal of garbage from beeches it should be noted: economic advantages, sanitary and hygienic. Economic advantages consist of probability of obtaining the additional income from the main consumers on waste recycling. The enterprises for processing will be in this case the main consumers of municipal solid waste of a

certain look, and will independently delete data a type of garbage from the urbanized territory [13,14]. For this purpose construction logistic a chain of consumers of this category of municipal solid waste is necessary. Other source of the income will be the possibility of obtaining energy from processing of separate types of municipal solid waste when processing [15]. Creation of a logistic chain between the place of a congestion of municipal solid waste, their type and the enterprise for processing of municipal solid waste is similarly necessary. As sanitary and hygienic advantages it should be noted storage conditions of municipal solid waste, in case of use of underground tanks esthetic properties of the urbanized territories are not broken. Also preliminary sorting of waste will allow to minimize amount of the taken-out municipal solid waste for further utilization.

The following stage is transportation of garbage which will be defined by the system of collecting installed at an initial stage. Formation of a route of transportation of processing of salvage is necessary [16,17]. When transporting waste need of minimization of a run of motor transport which is an intensive source of pollution of the atmosphere is not always considered. Therefore there is a need of creation of waste-loading stations and use of the high-loaded garbage trucks matters not only from the point of view of fuel economy, but also from the ecological point of view.

Due to introduction of waste-loading stations and optimization of system of collecting and sorting of waste in the cities decrease by 20-25% in a year of a stream of waste for grounds and, therefore, loads of the environment, reduction [18] of costs of the city of export and neutralization of MSW, and also return of secondary material resources to the sphere of production and consumption with market realization of salvage and compensation by that of a part of the budgetary costs of creation of sorting production is possible [19,20].

Design and construction of the complex plants providing use of waste as power source and secondary raw materials most is suitable for megalopolises. Complex processing of municipal solid waste provides small amount of production wastes, its maximum ecological and economic feasibility [21].

The final stage is the composting of waste and a waste-loading stations. Due to carrying out the previous stages, volumes of the burned municipal solid waste will be minimum, and respectively there will be also a minimum loading rendered on environment ecology [22]. Realization of the last stage requires construction of incineration plants [23] and enterprises which volume of processing have to be defined proceeding from statistical and standard data on accumulation of municipal solid waste in the urbanized territories. These norms depend on climatic features of the territory, structure of the population and structure of housekeeping.

### **3. Efficiency of using a systematic approach to garbage collection from urbanized territories**

Features of use of system approach when cleaning (destruction) of municipal solid waste from the urbanized territories is defined by a number of factors of the considered territory. It is necessary to consider structure and volume of household waste, which is very different and depends not only on the country and the area, but also on season, demographic features and economic and household features of the population. As a rule demographic, social and economic and household features exert impact on structure and volume of municipal solid waste. Climatic factors define specifics of building, special requirements to operation of technical means (containers and special transport), terms of removal of municipal solid waste. Placement of repair bases, parking of special transport, waste-loading stations, enterprises for neutralization and other services of sanitary cleaning of the city depend on planning of the city the extent of routes on waste disposal.

Thus, the carried-out theoretical analysis, allowed to establish that decrease in volumes of waste disposal is possible due to active use of sorting of waste at an initial stage of collecting municipal solid waste. At the same time, use of modern tanks for sorting and collecting house waste will allow to gain additional income from delivery of a part of raw materials directly to the consumer, on processing of separate categories (types) of municipal solid waste. In addition, garbage removal in process of filling of tanks, will allow to lower transport expenses and the ecological damage caused from operation of transport. As shows experience and researches municipal solid waste can be a power source and at the

same time effectively be used for energy saving. For effective use of system approach at a distance of garbage from the urbanized territories, it is necessary to make careful the analysis of the factors noted in work, influencing structure, structure, volume of municipal solid waste, and also places of their collecting. Creation of logistic systems taking into account these factors, in the analysis and formation of the enterprises for processing of separate types of garbage. will allow to increase the economic potential of the urbanized territory. Introduction of system measures for removal of municipal solid waste from the urbanized territories taking into account the factors making impact on the choice of system stages on cleaning of municipal solid waste will allow not only will solve a problem on recycling, but also to increase energy efficiency urbanized territories.

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