Problems of Utilization of Industrial and Consumer Waste in the Rostov Region

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Abstract. The problem of utilization of production and consumption wastes is relevant for many countries and regions. Most sharply it is shown in regions with high concentration of the population and production. Such region in the south of Russia is the Rostov region. Formation in the territory of the Rostov region of large volumes of industrial and consumption waste is bound to the production specialization of economy of the region, intensive agriculture, high concentration of infrastructure facilities, dense population, prevalence of the cities. In the system of collecting and storage of a wastage in the territory of the region there are considerable shortcomings – the large number of dumps is used, there is no recycling of a wastage. These problems cause the necessity of searching of the new efficient scheme of salvage. As a way of a solution of the problem of a salvage in the Rostov region creation of 8 intermunicipal ecological waste processing complexes is considered. Parts of each complex will be solid waste landfills, the plants on sorting of garbage, the station on an overload of garbage and other infrastructure facilities on processings of a wastage. As a result, this project will allow to capture garbage removal all settlements of the Rostov region, to adjust processing of a wastage in secondary raw materials, to perform deep disinfecting of garbage and burial of its safe parts that will be significantly improved ecological by a situation in the region.

1. Introduction
Recycling of production and consumption is an important environmental problem as around the world, and in the certain countries and regions. Active development of production activity, growth of population, an urbanization, increase in consumption of various goods, the invention of new synthetic materials promotes not only to considerable withdrawal of resources from the environment, but also to return to it of constantly growing activity waste. The main activities for work with industrial wastes and consumption is their processing for the purpose of safe destruction, creation of opportunities of repeated receiving the valuable materials which are contained in them [1]. Actions for work with waste as one of stages of their movement also utilization which has certain features of implementation in various regions of the country logs in.

2. Relevance and scientific importance of a question
Recycling includes the system of actions for use of waste at separate production phases and ensuring secondary processing of already fulfilled or defective products. Utilization is a cross-disciplinary problem and it is investigated by experts of various fields of activity – ecologists, geographers, biologists, physicians, engineers, economists, lawyers. The problem of handling of industrial and
consumption waste is considered in a number of domestic and foreign scientists. From domestic scientists on this subject we will distinguish Yu.M. Potashnikov [2], M.D. Kharlamov and A.I. Kurbatov [3], L.N. Gubanov [4] works, and from foreign scientists - Pellow D. N., Weinberg A., Schnaiber A [5], Bendery R. [6]. Cross-disciplinary approach in these researches allows not only to focus public attention to accumulation and utilization of garbage, but also to synthesize possibilities of various sciences in elimination of negative consequences of this environmental problem. At the same time the sharpness of a problem is caused by the advancing body height of volumes of industrial and consumption waste in comparison with opportunities on their processing, neutralizations and utilization. At the same time the sharpness of a problem is caused by the advancing body height of volumes of industrial and consumption waste in comparison with opportunities on their processing, neutralizations and utilization. Polluting all components of the nature, wastage makes negative impact on health of the person, breaks natural processes, and changes structural components of a landscape. Therefore, efficient work with a wastage which includes the system of measures for their utilization is a defining factor of sustainable development of society.

3. Problem definition
Despite similarity of the reasons and the main aspects of manifestation, the problem of accumulation and processing of waste has spatial specifics of manifestation. As it was already noted earlier, this problem in regions with the dense population developed by the industry and an infrastructure complex, intensive agriculture is most considerable. One of such regions of Russia is the Rostov region. Problems of this research is identification and the characteristic of space features of a problem of a salvage of production and consumption for the purpose of development and realization of the most effective measures for its decision in the circumstances in the region and minimization of negative consequences.

4. Theoretical part
The Rostov region is the second subject in the South of Russia on population (after Krasnodar region) and the second region on the area of the territory (after the Volgograd region). The features of a geographical location, favorable for life of the population of a condition of the nature, high concentration of inhabitants in rather compact territory and an arrangement here of the numerous enterprises of the industry and intensive agricultural defined essential anthropogenic load of society of the environment here. Current problem for the Rostov region is the situation which developed in the sphere of work with household, industrial, agricultural, biological and medical wastes.

As of the beginning of 2016 in the territory of the area 643 subjects to placement of waste, from them 415 – acting and 228 – preserved settled down (taken out of service) [7]. Among the operating objects of accumulation of industrial and consumption waste in the territory of the area 15 grounds of solid municipal waste, 6 grounds of industrial wastes and 250 dumps of household (municipal) waste, 21 objects of accumulation of industrial wastes work. At the same time within the region there are 129 unauthorized dumps of solid municipal waste, besides some of their part is not considered during environmental monitoring. The quantity of dumps in the territory of the region is gradually reduced owing to the undertaken measures for their closing and elimination. However, in size of unauthorized dumps the Rostov region was among 10 territorial subjects of the Russian Federation with their greatest number [8] that significantly complicates an ecological situation in the region.

In the territory of municipal units of the Rostov region two systems of waste disposal are applied. Container collecting municipal solid waste provides accumulation of garbage in the places of its temporary storage equipped with containers. In the absence of containers accumulation of municipal solid waste happens at consumers then loading in the garbage trucks coming to them is carried out. Despite the considerable efforts on development of system of collecting and removal of garbage, in the territory of some municipalities of rural areas of the Rostov region container platforms still are absent [9]. As a result, collecting and garbage removal in the majority of areas are not organized properly,
and the places of warehousing of a wastage existing in the territory of rural settlements do not meet sanitary standards and ecological requirements – they are polluters of a surrounding medium.

The volume of the produced waste in the Rostov region is in direct correlation dependence on the level of development of its economy. Economic activity and concentration of the population are those two factors which directly determine the size of the formed garbage. Annually in the area from 3 to 6 billion tons of industrial and consumption waste (table 1) are formed, i.e. on average it is the share of each inhabitant of the region 0,75 up to 1,5 tons of garbage a year [7]. Territorially the greatest number of a wastage (their about 1/3 total amounts) is formed in the administrative center of the Rostov region – Rostov-on-Don. Being the largest city in the south of Russia which population exceeds 1,1 million people, Rostov-on-Don forms a majority of a solid municipal waste bound to household and daily activity of inhabitants.

Table 1. Subjects to placement of industrial and consumption waste in the territory of the Rostov region, 2012-2016*

|                                  | 2012     | 2013     | 2014     | 2015     | 2016     |
|----------------------------------|----------|----------|----------|----------|----------|
| Quantity of educated industrial and consumption waste, one thousand tons | 4 053,7  | 3 208,3  | 6 232,1  | 4 248,2  | 3 988,2  |
| Quantity of the utilized industrial and consumption waste, thousands of tons | 1 194,6  | 2 160,3  | 2 473,3  | 1 108,4  | 839,6    |
| Share of the utilized and neutralized industrial and consumption waste in the total amount of an educated wastage, % | 36,96    | 75,03    | 46,77    | 34,66    | 46,65    |
| The volume of educated industrial and consumption waste per capita, kg on 1 person | 951,4    | 754,1    | 1 467,9  | 1 001,4  | 941,5    |

* It is calculated and made according to the Ministry of Natural Resources and Environmental Protection of the Rostov region and Federal State Statistics Service of the Russian Federation.

The size and structure of the formed wastage are influenced by various economic and technical factors. Those are extent of economic development of the settlement, level of improvement of a housing stock, specialization of economy of municipality and placement on its territories of the large enterprises, wear of the used equipment and technology of productions. The analysis of territorial distribution of formation of waste in the territory of the Rostov region, shows that their main producers are the cities (figure 1) in which the origins of waste are the industrial enterprises. Those are the city of Novocherkassk within which work the thermal power plant burning coal, fuel oil and natural gas; the city of Shakhty as the center of the coal-mining industry and ferrous metallurgy, the city of Volgodonsk where the Rostov Nuclear Power Plant is located. Besides the energy-generating enterprises, the significant amount of a wastage the enterprises for mining and the agricultural enterprises, the bound to production of fowl and pork form, production of vegetable oils. In number of leaders in formation of a wastage in the Rostov region also the municipal enterprise «Azov Water Utility» which is carrying out the water supply, water disposal and heat supply of the city of Azov collecting a wastage when processing and sewage treatment and waters of systems of reverse water supply enters.

The greatest contribution to formation of a problem of education and accumulation of industrial and consumption waste in the territory of the Rostov region branches of the production sphere – totally their share brings over 80% of all waste (figure 2) [7, 9]. The productions which are carrying out oscillation of the electric power, mining, agriculture and manufacturing industry (figure 2) in this regard are very ecologically dirty. At the same time it should be noted that types and a class of danger of the waste formed in separate branches it is various though their greatest part is the share of the least toxic waste IV and V groups of danger [9].
5. Practical importance, offers and results of introductions

Information obtained as a result of a research allow to define difficulties of a situation in the sphere of handling of industrial and consumption waste in the territory of the Rostov region. Environmental pollution because of accumulation of large volumes of garbage at their insufficient level of utilization and practical lack of waste recycling systems continues. Corollaries of this process is selection of extensive territories for places of waste storage which is delivered by wind, animals and birds, is washed away by water, polluting water objects and the soil. In the region there is a deterioration in health and wellbeing of the population, nonrational use of natural and secondary material resources continues.

As a result of the analysis of the advanced methods of management of works with a wastage applied in regions of the Russian Federation and the countries of the European Union for the Rostov region the innovative option of development of system of the address with a production and consumer wastage is accepted. It found expression in the regional long-term target program «Formation of a complex control system of a wastage and secondary material resources in the territory of the Rostov region for 2014-2020» [10, 11]. According to it in the territory of the area construction of 8 intermunicipal ecological waste processing complexes is provided – IEWPC (figure 3).

Each intermunicipal waste processing complex will include the ground on processing and burial of garbage, production sites on processing of secondary material resources. Today from 11 planned landfills three act already; for six landfills documents for allocation of the land plots to the investor of construction of IEWPC are processed. On one site the procedure of transfer of the earth to concession is started; and for one landfill the land plot for allocation is only defined. Besides, construction of 34 complexes on an overload of garbage and 31 stations of sorting of garbage will be required. Waste sorting complexes will be placed in various parts of the area according to population. In 2017 works on creation of the Volgodonsk and Krasnosulinsky IEWPC began, in the second quarter 2018 construction of Morozovsky and Salsk IEWPC, and at the end of 2018 – other complexes will begin. All eight IEWPC will be constructed only at the expense of funds from investors. Total investment in all 8 complexes will be not less than 7,5 billion rubles. Will begin with the Volgodonsk MEOK the functioning in 2018, and commissioning of other seven MEOK is planned in 2019.
6. Conclusions
The analysis of a problem of recycling of production and consumption not of the territory of the Rostov region showed its essential relevance and sharpness of manifestation. Constant growth of volumes of garbage and expansion of places of its accumulation create essential load of the environment of the region, health of the population, quality and a level of living of people worsens. For the purpose of an efficient solution of the problem of salvage in the region it is developed and the new territorial scheme of the address with a wastage on the basis of which the system from 8 IEWPC, which functioning will be bound to deep waste recycling is created is implemented. Introduction action of these complexes is planned to be carried out in 2018-19 and will demand from the population of development of technology of separate collecting waste, and from investors and operators of IEWPC of arrangement of the corresponding engineering-ecological infrastructure. As a result, the recycling model on the basis of rationally placed in the territory of the IEWPC area will promote, in our opinion, reduction of a problem of waste storage in a civilized framework on the basis of modern technologies of its collecting, accumulation and processing. In turn it not only will improve an ecological situation in the region, but also will bring a number of economic effects, will promote improvement of quality of life of the population.

7. References
[1] Shipilin N N 2014 Integrated management of a problem of utilization of garbage at the regional level (Novosibirsk: Gold ear Publishing) p 128
[2] Potashnikov Yu M 2012 Utilization of production and consumption wastes (Tver: Publishing house of the Tver state technical university) p 151

[3] Kharlamova M D and Kurbatova A I 2015 Solid waste: technologies of utilization, control methods, monitoring (Moscow: Publishing house YURAYT) p 231

[4] Gubanov L N, Zvereva V I and Zvereva A Yu 2011 Processing and utilization of solid waste and rainfall of sewage (Nizhny Novgorod: Publishing house of the Nizhny Novgorod state architectural and structural university) p 387

[5] Pellow D N, Weinberg A and Schnaiberg A 2000 Urban Recycling and the search for sustainable community development (Princeton: Princeton University Press) p 232

[6] Rue Bender, edition chapter 2008 Management of municipal solid waste (Pskov: Branch of the St. Petersburg state engineering and economic university in Pskov) p 97

[7] About state of environment and natural resources of the Rostov region in 2016 ed V G Goncharov and G A Urban (Rostov-on-Don: Ministry of natural resources of the Rostov region) p 369

[8] Zhirnyakova A 2017 In the territory of the Rostov region counted up to 600 pirate dumps Rostov newspaper. News portal https://rostovgazeta.ru/news/society/01-03-2017/

[9] The territorial scheme of work with a wastage in the Rostov region 2016 (Rostov-on-Don: Ministry of natural resources of the Rostov region) p 3110

[10] Manusov V Z, Antonenkov D V, Solovev D B 2018 Estimation of Energy Consumption of DM-H Drill Rig Main Drive in Far North Conditions 2018 International Multi-Conference on Industrial Engineering and Modern Technologies (FarEastCon), International Conference on. pp 1-5 [Online]. Available: http://dx.doi.org/10.1109/FarEastCon.2018.8602484

[11] Formation of a complex control system of a wastage and secondary material resources in the territory of the Rostov region for 2014 – 2020. The Regional long-term target program. It is approved by the resolution of the Government of the Rostov region of 31.10.2012 the no 983 (Rostov-on-Don: Government of the Rostov region) http://www.donland.ru/Default.aspx?pageid=114623