TOWARDS ON THE WAY TO THE CIRCULAR ECONOMIC MODEL

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Abstract

In the article was analyzed the processes of formation of correspondence to the principles of the circular economy. The main "pain points" of the transition of Russian society to the circular model of the economy ensuring rational use and restoration of natural, production, financial and human capital, as well as the resumption of resources are considered. The focus on the circular economy is minimizing waste and improving the environment, providing economic and social results are revealed.

The purpose of the research is to highlight the problems and prospects for moving to adherence to the principles of the circular model of the economy in the Russian Federation.

The results of the research are of interest in terms of forming modern ideas about the degree of environmental and economic problems in Russia and the prospects for their solution. Measures have been proposed to address the problem of waste processing and recycling in the Russian economy.

Keywords: circular economy, economic model, wastes processing.

1 INTRODUCTION

In September 2015 year, the United Nations defined 17 sustainable development goals [12] and 169 tasks for their achievement, which the world community should solve until 2030 year. The 12 goals are determined by the need to guarantee the stability of consumption and production [7]. This goals are aimed at the rational use and conservation of natural resources, the reduction of environmental pollution and implies the need to replace the traditional linear economic model with a resource-efficient closed-cycle model [4] - the circular economy - the economy of innovation, both technical and social [8], [9].

There are some variants of business models that meet the principles of a circular economy are presented in Table 1.

Table 1. The main approaches implemented in the business models of the circular economy

Direction of business model	Implementation Positions
Create circular value chains or circular shipments	Limited resources are replaced by fully renewable sources
Recovery and recycling	Using of technological innovations for the restoration and reuse of resources. It is based on a closed cycle of processing, which provides for the processing of waste into new resources
Increase product life cycle	Allows, through restoration, repair, modernization or remarketing of the product, to preserve the economic benefit as long as possible, i.e. The transition from selling things to selling services for their use
Exchange and joint consumption	It is built on the exchange of goods or assets that have a small utilization factor
Product as a service	The use of products by customers through "lease" with payment after use

Source: compiled by the authors based on [11]

All the presented business models are in aggregate interconnected in the target solution of resource-efficiency problems. So, circular supplies provide the requirements for the development, production and distribution of material resources that don't have an ecological trace, it means not giving waste. Rehabilitation and processing are aimed at converting waste into new raw materials and application in a new product. The extension of the life cycle involves the restoration of used products or parts of it, returning to it the value of the consumer. Exchange and joint consumption are aimed at re-use of products. "Product as a service" is realized through the provision of goods for temporary use with a package of services for its maintenance.

Numerous publications testify to a number of positive results of a number of countries from the introduction of the principles of the circular economic model, affecting the economy as a whole and the environment. At the same time, for the resource-producing countries to which Russia belongs, the circular economy carries the threat of declining incomes and breaking the mentality of possessing untold wealth in the bowels of the vast territory.

2 SOURCES AND METHODS

The information base for the research is served as United Nations documents, the legal framework governing the various aspects of environmental protection and regulating waste management in the Russian Federation, speeches by leaders of the Federal Service for Supervision of Natural Resources, the data of the Federal State Statistics Service, the different researches of Russian and foreign scientists, the material from mass media, media publishing and public organizations. In the process of preparing this article was using general scientific methods and specific methods such as: observation, abstraction, analogy, deduction, induction, analysis, synthesis, formalization, comparison and generalization.

3 RESULTS

For several decades, significant efforts in the world were aimed at achieving rational use of resources and developing environmental responsibility. In Russia all these aspirations brought only insignificant results. According to Christian Lange [1], the reason for this is that "production has long gone beyond the planetary boundaries and the environment today" is not for life, but for death beats "with its massive pollution." It is emphasized that "the ecological rationality of enterprises is impossible in conditions of irrationality of society" [1]. The last statement has direct bearing on the situation in Russia, which faces numerous problems of resource saving and environmental protection.

The events of March 18, 2018 year in the Moscow region (100 km near Moscow),when 50 children from different schools in Volokolamsk turned to doctors after a powerful release of hydrogen sulfide occurred at the landfill Yadrovo training ground, a tragic but vivid demonstration of the authorities' inefficient work on organizing work with the processing of solid municipal waste (hereinafter - SMW).

According to the Federal Service for Surveillance in the Field of Nature Management [16] nine months before this tragedy, it was stated that the problem of waste management is one of the most socially significant, practically for all subjects of the Russian Federation. A total of more than 5 billion tons of production and

consumption waste of the I-V hazard class is generated annually in the Russian Federation.

Including the formation of about 35-40 million tons of SMW or in volume units more than 200 million m3. It should be noted that this amount is only from the population. Every year, Russians throw 70 million tons household garbage. This is 10 times the weight the pyramids of Cheops (6.2 million tons) [22]. At the same time, SMW is formed from small and medium-sized businesses, non-residential facilities, large-scale industries, so the real figure is much larger (See in Figure 1).

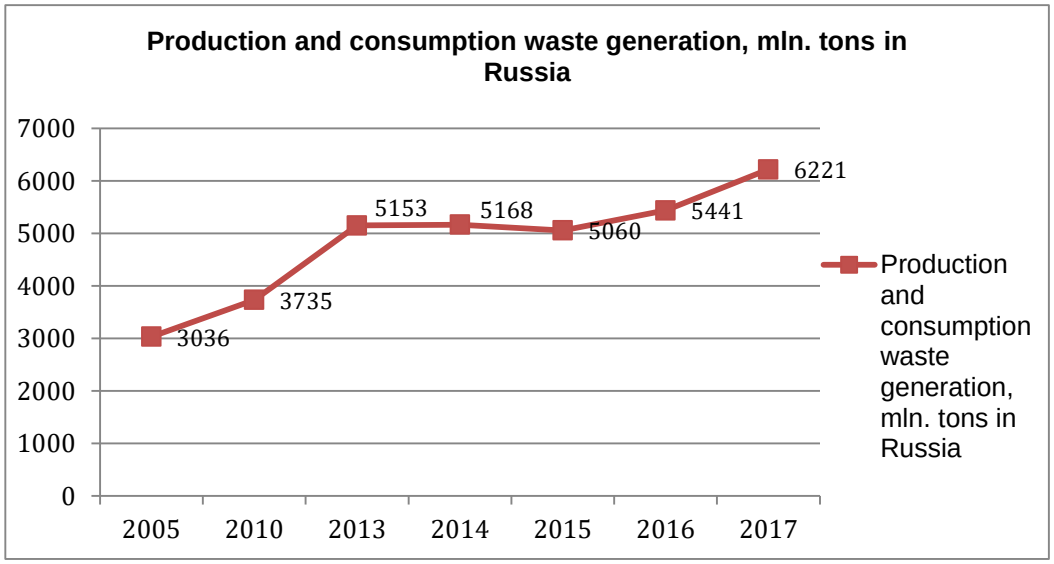

Fig. 1. The formation of production and consumption wastes in Russia

Source: compiled by the authors based on [18]

Almost all of this volume is later placed on SMW dumps, sanctioned and unauthorized dumps.

Unfortunately, the number of unauthorized dumps exceeds the number of legal waste disposal facilities by more than 2 orders [16].

Despite the work on the elimination of unauthorized dumps, the number of them annually doubles. The growth forecast for "wild" dumps is presented in Figure 2.

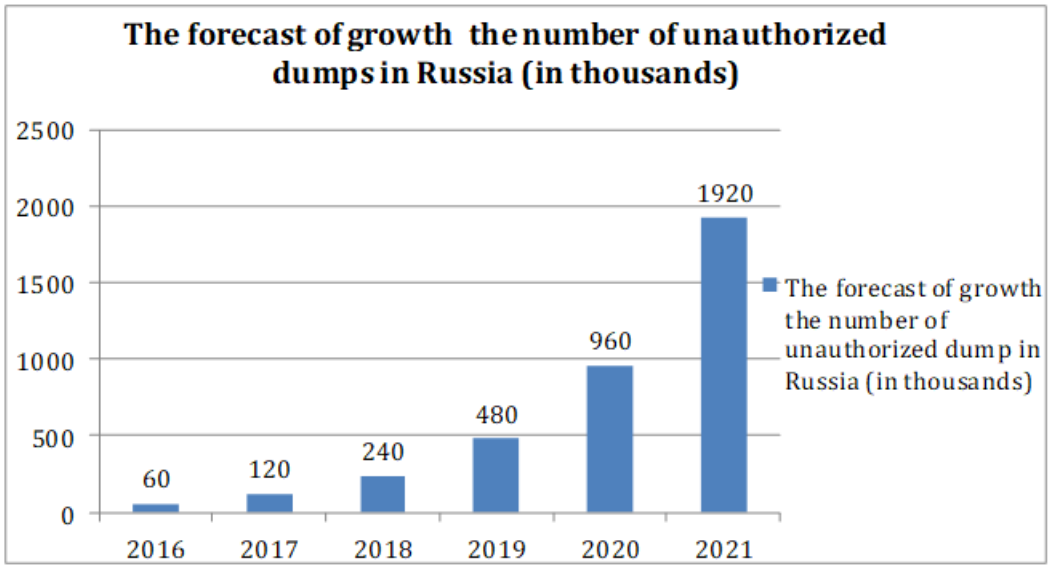

Fig. 2. The forecast of growth the number of unauthorized dumps in Russia (in thousands)

Source: compiled by the authors based on [22]

The forecast made by Greenpeace experts was initially optimistic: the number of "wild" dumps in 2016 ear was 173 thousand [16], which is almost three times more than predicted. Despite the annual elimination of

70-80% of such dumps, the authorities regularly lose the battle - "wild" dumps appear again. This is due to the insignificant fines for managing companies of housing and communal services for taking out garbage and throwing somewhere - up to 50 rubles. At the same time, garbage disposal costs from 8-10 thousand rubles per car [3].

The magnitude of the disaster to combat dumps in Russia can be observed through an interactive map of landfills [6] (See Figure 3) - the General Cleaning Project of the All-Russian People's Front (hereinafter - ARPF).

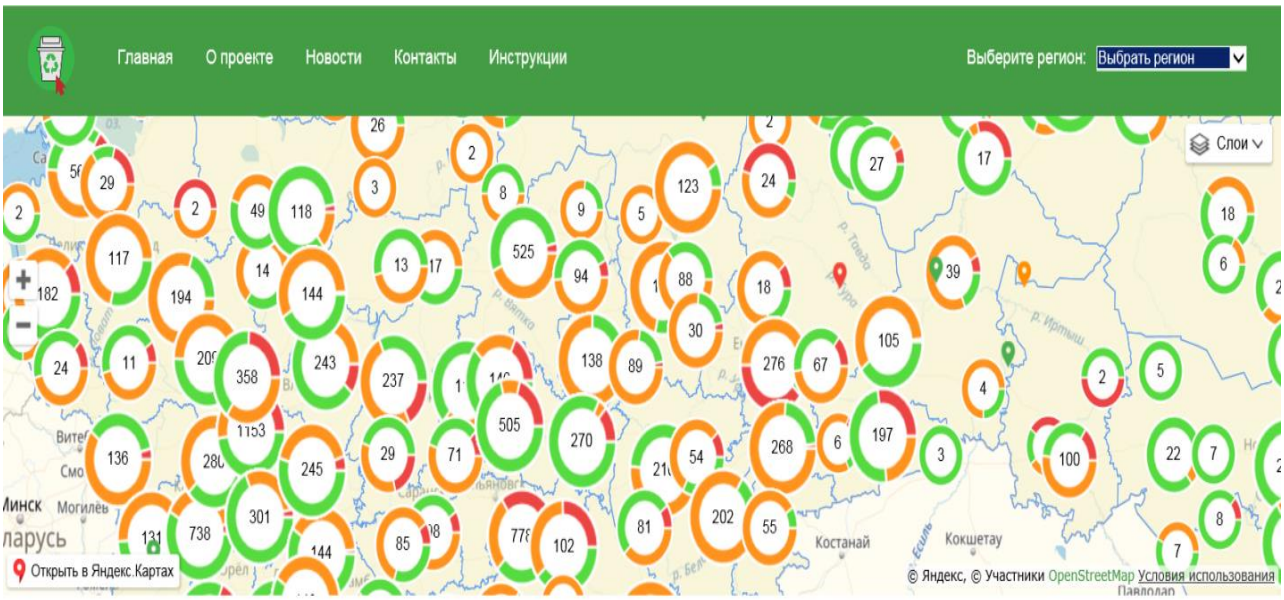

Fig. 3. The garbage dumps in the European part of Russia

Source: screenshot from the screen [6]

Open network project ARPF "General cleaning" gives an opportunity to people who are ready to take part in the cleaning of a number of "garbage objects", to contribute to the improvement of the environmental situation by becoming volunteers. In general, the project is aimed at increasing the effectiveness of public control by citizens over the sanitary condition of their region.

The growth of officially registered 1,000 dumps and about 15,000 authorized dumps annually makes up 0.4 million hectares of the country's territory, i.e. "Every year in Russia, the dumps area is increased by an area equal to Moscow and St. Petersburg taken together "[22].

In the framework of the state policy in the field of environmental development of the Russian Federation for the period until 2030 year [5], waste management is envisaged for separate collection of waste, severe sanctions for improper disposal, and a phased introduction of a ban on disposal of waste suitable for recycling. Since 2018 year, a ban on the disposal of certain types of waste has been introduced: metal scrap and waste, thermometers, mercury lamps, aluminum cans scrap, aluminum foil - in total in the list - 182 points.

The only safe and civilized way of handling waste is processing, that is, a system in which waste is divided into types so that from them it is possible to create new things, rather than simply throw them away. The disposal of unsorted waste leads to a permanent loss of up to 90% of useful products, 9 million tons of waste paper, 1.5 million tons of ferrous and non-ferrous metals, 2 million tons of polymer materials, 20 million tons of food waste, 0.5 million tons of glass [10].

In Russia there is no separate waste collection system yet. It can take 10-15 years to create it. But only it will create a base for waste processing, which will allow reducing the amount of rubbish in Russia by 75-80% by 2030 year - which means that the quantity landfills. Now 243 garbage processing plants, 40 incinerators and waste sorting complexes [19], do not reach full capacity due to a shortage of raw materials, which in turn is rotting in landfills.

The reason is that the averaged costs for incineration of garbage are 10 times greater than for landfilling in dumps, and the initial sorting of garbage is 4 times more expensive [17]. It is cheaper to pay for burial, which means that the waste recycling industry and their involvement as secondary material and energy resources

are less attractive for business.

It should be noted that the technology of incineration of waste with subsequent burial is difficult to attribute to the processes of the circular economy due to the destruction of resources and energy, increased emissions of harmful substances into the air and contamination of groundwater [13].

Many industrial enterprises cannot realize their need for recycling, for processing and production of new products. For example, in the Moscow region, there are 25 processing enterprises that are in acute shortage of raw materials. This is despite the fact that 20% of Russia's garbage is concentrated in the Moscow region [14].

Changes in legislative regulation [20], regulating expansion of waste management options for industrial enterprises, intensified efforts to establish a waste management system. At the same time, researchers (Pakhomova N.V., Richter K.K., Vetrova M.A.) state that the adopted standards for utilization are significantly behind the analogous indicators of developed countries [13], [14].

The analysis of investment in fixed assets for nature protection purposes (See Figure 4) shows a trend of annual decline, which does not inspire optimism in the speedy achievement of legally defined goals.

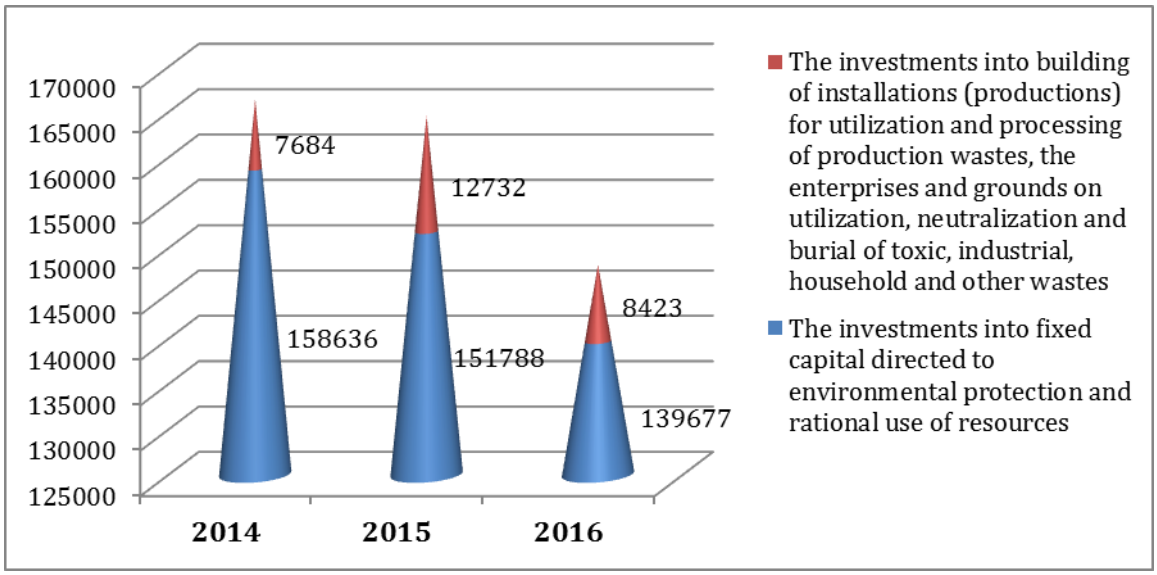

Fig. 4. The Investments in fixed assets aimed at protecting the environment

(in actual prices, millions of rubles)

Source: compiled by the authors based on [18]

The level of secondary use of industrial waste in Russia for 2017 year is about 50% [21], solid household waste - not more than 4% [10]. The highest indicators of waste use as secondary raw materials are characterized by ferrous and non-ferrous metallurgy, pulp and paper industry, construction materials industry. Thus, the share of secondary raw materials in steel production averages about 27%, cardboard and paper 18%, mineral binders (gypsum, cement) 20.6%, non-metallic building materials (crushed stone, gravel, sand) 3.6% , thermoplastics products - 4.2%.

A number of types of products are produced entirely or almost entirely from secondary raw materials - certain types of paper and paperboard, articles of wide economic consumption from polyethylene (boxes, buckets, watering hoses, film, etc.) [2]. Despite the "traditional" use of this waste as a secondary raw material, its share in comparison with use in other countries is small.

Understanding the causes of slow processes of introduction of processing and recycling of waste in Russia allowed the authors, based on the benchmarking experience of foreign countries, to determine a number of priority measures in the following positions:

- Introduction of separate collection of garbage by the population with reduction or cancellation of utility payments for its export;

- Opening of reception points for all types of waste from the public;

- the creation of a central network structure for monitoring the use of waste (in Japan, this role is performed

by the Ministry of Health and Welfare [15], which in the opinion of the authors is logical because of the harm caused by landfills to health and the environment);

- Using a system of tax breaks for companies investing in environmentally friendly enterprises and enterprises using waste (in Japan in the first year, the tax burden can be reduced to 25% [15]);

- To ensure the activation of the processes of creating closed supply chains, by creating stock exchanges of secondary raw materials or an automated system for collecting and analyzing information on industrial waste containing all information about the companies where the waste is generated and about the processing enterprises;

- Legislatively fix the minimum banking rate for long-term loans (up to 10 years) for measures to prevent environmental pollution and waste processing (in developed countries it is 6.5-7%).

4 CONCLUSIONS

Summarizing the observations of this research, the authors should be noted that the legislative initiatives of recent years and the intensification of state measures to solve problems with recycling and reuse of wastes in the Russian Federation have so far not been successful in creating the basic basis for the transition to the principles of a circular economy.

At the same time, one cannot but admit that the potential for a transition from a linear model of the economy to a more efficient circular model is significant.

It is so necessary to change the instruments for stimulating investment activity in the vector of following the principles of the circular economy, and also to provide state support to business in introducing environmental innovations in waste processing.

REFERENCE LIST

Cloud key to rational use of resources (2015) https://ecm-journal.ru/post/Oblachnyjj-kljuch-k-racionalnomu-raskhodovaniju-resursov.aspx.

Conceptual basis for solving the problem of the use of secondary raw materials in Russia. (2003). http://www.waste.ru/modules/section/item.php?itemid=41/.

Dumps were given three years: when in Russia they will start collecting garbage separately.(2018) https://w2e.ru/news/svalkam-dali-tri-goda-kogda-v-rossii-nachnut-sobirat- musor-razdelno /.

Ellen MacArthur Foundation. Towards the circular economy UK. (2013). https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf.

Fundamentals of state policy in the field of environmental development of the Russian Federation for the period until 2030. (2012). http://base.garant.ru/70169264/.

Interactive map of dumps. (2018). http://kartasvalok.ru/#.

Goal 12: Ensure sustainable consumption and production patterns.(2018) https://www.un.org/sustainabledevelopment/sustainable-development-goals/.

Kazakova N.A., Gendon A.L., Khlevnaya E.A., Sedova N.V. Prediction of development in the mining and chemical industry in Russia and in the world // Gornyi Zhurnal. 2017. No. 4, pp. 49-52. DOI: 10.17580 / gzh.2017.04.09

Kazakova N.A., Gendon A.L., Khlevnaya E. A. Development potential of Russian mining-and-chemical holdings. GORNYI ZHURNAL, 2016, No. 7, pp. 89-91.DOI: dx.doi.org/10.17580/gzh.2016.07.19

Kononets N.N. Using of waste as secondary resources. (2017). http://www.mnvnauka.ru/2017/04/Kononets.pdf.

Lacy P., Rutqvist J. Th. Product as a Service Business Model: Performance over Ownership. Lacy P.,Rutqvist J. Waste to Wealth. The Circular Economy Advantage. UK Palgrave Macmillan, 2015, pp. 99-114.

Official website of the United Nations. (2018). https://www.un.org/sustainabledevelopment/sustainable-development-goals/.

Pakhomova N.V., Richter K.K., Vetrova M.A. Transition to the circular economy and closed supply chains as a factor of sustainable development. (2017).http://vestnik.spbu.ru/html17 /s05/s05v2/03.pdf.

Pakhomova N.V., Richter K.K., Vetrova M.A. TRANSITION TO CIRCULAR ECONOMY AND CLOSED-LOOP SUPPLY CHAINS AS DRIVER OF SUSTAINABLE DEVELOPMENT REGNUM. (2017). https://regnum.ru/news/economy/2345876.html.

Pavlenko E.A. Foreign experience of using secondary resources. (2001). http://dspace.nbuv.gov.ua/bitstream/handle/123456789/90238/63-Pavlenko.pdf?sequence=1.

Report of the Deputy Head of the Federal Service for Supervision in the Sphere of Nature Management A.M. Amirkhanova "On the development of territorial schemes by the subjects of the Russian Federation in the field of waste management"(2017).http://rpn.gov.ru/results_reports.

Report of the Head of the Federal Service for Supervision in the Sphere of Nature Management V.V. Kirilova "On the Regional Aspects of Treatment of Consumption Wastes in the Russian Federation" (.2017). http://rpn.gov.ru/results_reports.

Russia in figures. (2018). http://www.gks.ru/bgd/regl/b18_11/Main.htm.

Russia will toughen penalties for creating landfills. (2018). https://www.pnp.ru/social/v-rossii-uzhestochat-nakazaniya-za-sozdanie-svalok.html.

The Federal Law "On Amendments to the Federal Law" On Production and Consumption Waste "No. 458-FZ of December 29, (2014).

Utilization and decontamination of production and consumption wastes by economic activities in the Russian Federation. (2018). http: //www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/environment/ #.

What to do with garbage in Russia. (2016). http://www.greenpeace.org/russia/ru/press/reports/Russian-garbage-2016/.