Market of plastic waste in Kazakhstan[1]

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Abstract. This article examines the problems of the plastic waste market and the main factors affecting the recycled plastic waste markets.
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Every year around the world, billions of tons of plastic are burned or dumped into landfills, which in turn is a waste of valuable resources. In Kazakhstan, millions of tons of plastic waste are generated annually, only a small part of about 10% is recycled. According to article 351 of the Environmental Code of the Republic of Kazakhstan [1], plastic waste is classified as waste prohibited for burial at landfills, but is classified as secondary raw materials. Separate collection and recycling of this plastic waste will bring significant economic and environmental benefits to Kazakhstan.

The above figures, in comparison with world experience, allow us to conclude that Kazakhstan is critically lagging behind developed countries in terms of sampling and recycling of waste (10% versus more than 60% in Western Europe, USA, Japan). However, positive trends have been observed in the past few years. First, the collection rate is increasing. Secondly, the waste collection and sorting system is changing. Separate collection, which is the main source of raw materials in developed countries and can significantly improve the business economy, in Kazakhstan has practically no effect on the market.

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Currently, there are about 130 enterprises in the Republic that sort and process waste, producing more than 20 types of products: plastic, metal, wood, glass, paper, rubber crumb and rubber products [2]. A significant amount of separately collected plastic is not actually recycled: almost half of the plastic waste collected in Kazakhstan is exported and the final processing of this plastic waste is largely unknown. Finding and promoting examples of European manufacturers using recycled plastics to make new products can stimulate greater use of recycled plastics as raw materials in local markets and reduce the need to export material for recycling.

There are certain barriers that limit the use of plastic waste in the manufacture of new plastic products.

Technological barriers related to the quality of the raw material were identified, including the presence of mixed types of plastics and other contaminants in the collected waste. Indirect technological barriers include a lack of design for the recycling of plastic products and a lack of diversification of existing recycling technologies, which are currently mainly focused on packaging waste.

Legal barriers stem from the fact that plastic waste is traded internationally. Inharmonized systems across geographic regions and the existence of an illegal waste market are major obstacles that need to be addressed in legislation.

Barriers were also identified in relation to the market / value chain / logistics aspects. Another problem that can hold back investment is the volatility of the price of plastic waste versus virgin plastics.

Knowledge gaps identified are addressed through interviews with relevant stakeholders, where possible and relevant.

Kazakhstan's waste management policy is aimed at developing the waste processing sector with the production of products from secondary raw materials. This policy is reflected in the Concept for the transition of the Republic of Kazakhstan to a "green economy", approved by the Decree of the President of the Republic of Kazakhstan dated May 30, 2013.

There are dozens of enterprises in the country for the disposal and processing of various types of raw materials: paper, plastic, glass, waste tires, electronic, medical, mercury-containing and other types of waste. Table 1 shows complete information on technologies for processing plastic waste in the context of areas used in the Republic of Kazakhstan.

Table 1– List of technologies for waste processing in the Republic of Kazakhstan

№	Waste type	Regions	Product name
1	Plastic (PET	Akmola	Recyclable materials

	containers, PET packaging, plastic)	Aktobe	Manholes, rings for engineering networks
		Almaty	Production of recycled PET granules
		Atyrau	Recyclable materials
		East Kazakhstan	Production of sanitary ware - polyethylene polypropylene pipes and fittings for them
		West Kazakhstan	Production of hatches, tiles and tiles made of polymers, sewer hatches, paving and facing tiles.
		Karaganda	Sewer hatches, Recyclables, PET flakes
		Kostanay	Geotextile production, Sorting and recycling
		Kyzylordinskaya	Paving slabs, roof tiles
		North Kazakhstan	Recyclable materials
		South Kazakhstan	Recyclable materials
		Turkestan	Staple fiber
		Nur-Sultan	Ecowool
		Almaty	Plastic crumbs, non-woven materials, furniture, products, paving slabs
2	Polyethylene	Akmola	Recyclable materials
		Atyrau	Recyclable materials
		East Kazakhstan	Production of polyethylene products
		Zhambyl	Release of siding and sewer pipes
		West Kazakhstan	Recyclable materials
		Karaganda	Recyclable materials
		Kostanay	Geogrid, manholes, insulating materials
		North Kazakhstan	Polyethylene products
		South Kazakhstan	Recyclable materials

		Nur-Sultan	Recyclable materials
		Almaty	Plastic products

As can be seen from table 1, almost all organizations from the listed regions of the Republic of Kazakhstan are engaged in the processing of PET waste into recyclable materials (granulate), which can be used in the manufacture of products with reduced consumer properties (fibers, including non-woven and geosynthetic, tapes, sheets, etc. products for technical use), including in the Akmola region, where only one enterprise "LS Kokshetau" in Kokshetau is engaged in this activity. But it can also be noted that organizations located in West Kazakhstan LLP "Antey" and Kyzylorda LLP "Ibraikhan and K-LTD" regions and the city of Almaty Rocket Plastic use recycled PET in their own technological cycle for the production of final products based on it, such as production of building materials. In Kostanay, it is also planned to launch the production of building materials from plastic waste. Despite the quality and environmental friendliness of polymer sandy building materials in Kazakhstan, the demand for these materials is very low and are individual requests. Large construction companies prefer traditional building materials made from cement, sand, etc.

The main factors affecting the markets for recycled plastic waste:

- ✓ volatile dynamics of prices for primary materials;
- ✓ stagnation of demand for final products (processed products);
- ✓ changes and improvements made to environmental legislation;
- ✓ lack of raw materials for processing.

The latter factor is a key obstacle to the development of the plastic waste disposal market. The inability to ensure stable supply volumes, without which it is impossible to establish an effective business, is a consequence of the lack of an effective plastic collection system and a lack of sorting capacity. In addition, until recently, there were no economic and legislative incentives to increase the volume of recycling waste. At the same time, the beneficial use of waste is, in fact, the only solution to the "waste problem", since the flat placement of waste as a way of their circulation is in a critical state. Waste incineration (even with the production of energy) also cannot be considered as an alternative to the return of useful fractions into circulation.

At present, the situation in the field of waste management in the Republic of Kazakhstan is fundamentally changing, the last few years have become the main ones for this area: the priority of waste recycling has been designated, a development strategy has been developed, the legislation has been radically revised. In fact, the formation of a new industry has begun. The reform includes:

1) preparation and approval of territorial waste management schemes in each region of the country;

2) selection of regional operators who will be responsible for the entire waste management cycle, including the creation of the necessary infrastructure;

3) setting the tariff for the region for the waste management service;

4) creation of modern high-tech complexes for waste disposal.

In parallel with these measures, it is planned to gradually introduce separate waste collection in the regions.

The plastic waste market is very complex: it includes many different types of participants with very different and often opposing goals and often with direct relationships only with participants at the same step in the value chain. From a technical point of view, it includes many sometimes interchangeable but often mutually exclusive polymers, and market conditions are largely dependent on a completely external factor: the price of oil.

To facilitate analysis, the market has been broken down into submarkets: markets between two interrelated types of participants in the value chain. The purpose of the market analysis is to identify factors hindering the development of the plastic waste disposal market in Kazakhstan. Where these barriers affect multiple participants and types of participants, they can be characterized as hot spots. Identifying hot spots allows for the formulation and analysis of policies that can be used to address these hot spots in order to free up the market and the flow of recycled plastic through it.

The recycled plastics market is facing a number of technical and socio-economic challenges that hinder an increase in recycling volumes.

One of the key problems is market fragmentation and lack of communication between the parties. The plastic market is very complex and cannot be described as a “single market”. Plastic waste comes from several very different waste generators (eg municipal, industrial, agricultural, etc.), and "plastic" is a generic term for many chemical polymers (eg PP, PE, PET, etc.). The use of composites composed of several types of polymers and additives further complicates the recycling process.

The value chain for recycled plastic is shown in figure 1.

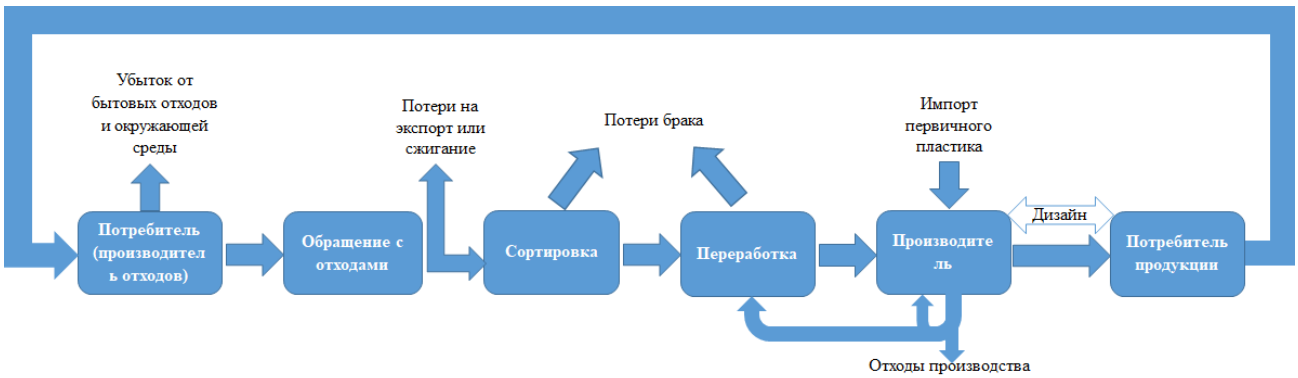

Figure 1. Value chain for plastic waste recycling

Each arrow in the value chain represents a relationship between two parties and thus represents a submarket. The supply and demand issues of these submarkets depend on the number of players, substitution opportunities and legal requirements.

The recycled plastic market includes several sub-markets in the value chain. Plastic products and raw material requirements are also very diverse. There are a number of different polymers with different properties, which are sometimes mixed and added with additives to achieve specific properties. This means that quality requirements are not only a matter of high or low quality, but also a matter of using the right type of plastic for the right type of product.

There are many challenges associated with recycling mixed plastic waste from households and recycling centers, but this fraction can also have great potential for increasing recycling volumes. However, this may be associated with higher costs than incineration, since the separate transportation of light and bulky waste is expensive and the automatic sorting technology requires significant investment.

The lack of supply and demand for recycled plastic was highlighted throughout the value chain. This is likely due to the very fragmented nature of the market.

Many stakeholders point out that increased collaboration in the value chain is key to increasing plastic recycling.

Developing the correct recycled plastic specifications for a specific product can be costly. To make this investment, the manufacturer must be confident in the supply of the specified plastic. This is an ongoing problem.

Many stakeholders point to the development of plastic products for recycling as an important opportunity to increase plastic recycling. Particularly problematic are articles composed of several plastic polymers.

The diverse nature of the market means that measures to increase plastic recycling must also be varied.

References

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