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## Экологическая и экономическая эффективность производства строительных материалов из отходов стекла

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**Аннотация.** В статье рассматриваются вопросы экологической и экономической эффективности производства строительных материалов из отходов. Экологическая эффективность. Производство строительных материалов из отходов позволяет решить ряд экологических проблем, таких как сокращение объемов захоронения отходов, снижение выбросов загрязняющих веществ в атмосферу, повышение качества окружающей среды, снижение затрат на производство, снижение затрат на утилизацию отходов, повышение рентабельности производства. Строительная отрасль является одним из крупнейших источников отходов. По оценкам, ежегодно в мире образуется около 1,3 миллиарда тонн строительных отходов. Эти отходы занимают значительные площади, загрязняют окружающую среду и представляют опасность для здоровья человека. Производство строительных материалов из отходов имеет как экологические, так и экономические преимущества. Это перспективное направление развития строительной отрасли, которое позволяет решать экологические проблемы и одновременно повышать рентабельность производства.

**Ключевые слова:** строительные материалы, отходы, экология, экономика, эффективность.

## Environmental and economic efficiency of production of building materials from waste glass

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**Abstract.** The article discusses the issues of environmental and economic efficiency of the production of building materials from waste. Environmental efficiency. The production of construction materials from waste allows solving a number of environmental problems, such as reducing the volume of waste disposal, reducing emissions of pollutants into the atmosphere, improving environmental quality, reducing production costs, reducing waste disposal costs, increasing production profitability. The construction industry is one of the largest sources of waste. It is estimated that about 1.3 billion tons of construction waste are generated annually in the world. These wastes occupy significant areas, pollute the environment and pose a danger to human health. The production of construction materials from waste has both environmental and economic advantages. This is a promising direction for the development of the construction industry, which allows solving environmental problems and at the same time increasing the profitability of production.

**Keywords:** building materials, waste, ecology, economy, efficiency.

## 1. Introduction

Glass waste often represents broken glass products, which can arise not only as a result of production stages, but also in domestic conditions during operation.

According to generally accepted standards, glass waste can be divided into recyclable materials of the first and second grades. In the first case, the size of the cullet fractions should vary from 0 mm to 50 mm.

For the second grade, weight, size and volume do not matter. However, we should not forget that the presence of multi-component structures, especially those glued together with polymer tapes and films, is unacceptable in such glass waste.

Recycling of cullet plays a priority role in saving resources and primary raw materials in enterprises, and also helps preserve the environment and maintain cleanliness. It is for these reasons that waste glass found its subsequent use in the manufacture of drink bottles, medicinal bottles, household cans and other similar products. It is worth noting that glass is 100% recyclable, which in turn eliminates the presence of additional waste [1].



**Figure 1.** Glass waste.

## 2. Goal and tasks

The goal of our project is the production of building materials and souvenir products from glass waste.

1. Organization of collection of broken glass raw materials and glass containers,
2. selection of production and warehouse premises, production equipment.
3. Setting up the production process
4. Sales of products, establishment of reliable sales channels for finished products

Making building materials from broken glass and glass containers has great environmental and economic significance. Recycling of glass raw materials is the reduction of waste of glass and glass containers, from which it is possible to obtain a new type of building material needed by the Republic of Kazakhstan. Opens the door to new opportunities, economically beneficial and affordable construction products. Glass tiles are a stylish solution for modern design and interior [2].

The facing material is characterized by low cost. The raw materials for the manufacture of products are glass waste and glass containers, and the organization of tile production itself will not require significant investments, and the manufacturing technology is quite simple.

In the production of building materials, more and more types of raw materials are gradually used, not with the exception of steel and waste generated during the production process.

Making tiles from broken glass is not an innovation, this technique is used in Europe, we would like to use this technology with a change in the technique towards the economic benefit of obtaining the product. So, to obtain economic benefits, we use marble chips instead of dyes, which will give the product strength and color. We, considering and studying technologies on this topic, came to the conclusion that this topic is relevant for Kazakhstan [3].

### **3. Main stages of implementation**

Organization of collection of recyclable materials, where a well-established channel for supplying the necessary waste has a large share of success. Therefore, the first step is to open a cullet collection point. This can be any room: basement, garage, warehouse, etc.

Primary processing of glass waste. The glass, cleared of debris and contaminants, is crushed in a glass crusher. The uniformity of coloring of the future product depends on how small the finished particles are. Connecting components. There are recommendations for maintaining the proportions of glue and glass in a ratio of 1:20. The amount of dye added depends on the desired degree of color saturation of the finished tile. Forming tiles. The finished mixture is placed in molds, where it remains until completely hardened [4].

Low production cost. Creation of unique products with the required properties. To sell products, we will create a product advertising website, use free advertisements on posts and boards; presentations of finished products for construction organizations and customers of

stores selling building materials; searching for clients on websites, working on all social networks.

#### 4. Manufactured products

Glass tiles are a worthy alternative, the advantages of which are their external characteristics, excellent quality, and range. In turn, in terms of strength, it is in no way inferior to the ceramic one that everyone is accustomed to (figure 1).

Glass tiles are facing and are produced with the aim of transforming and improving the interior, giving it style and adding shine, in the literal sense of the word.

The glass tiles we produce, in turn, are a fairly cheap building material, but their importance is very great in construction. For exterior decoration of buildings, for finishing work in kitchens and bathrooms [5, 6].

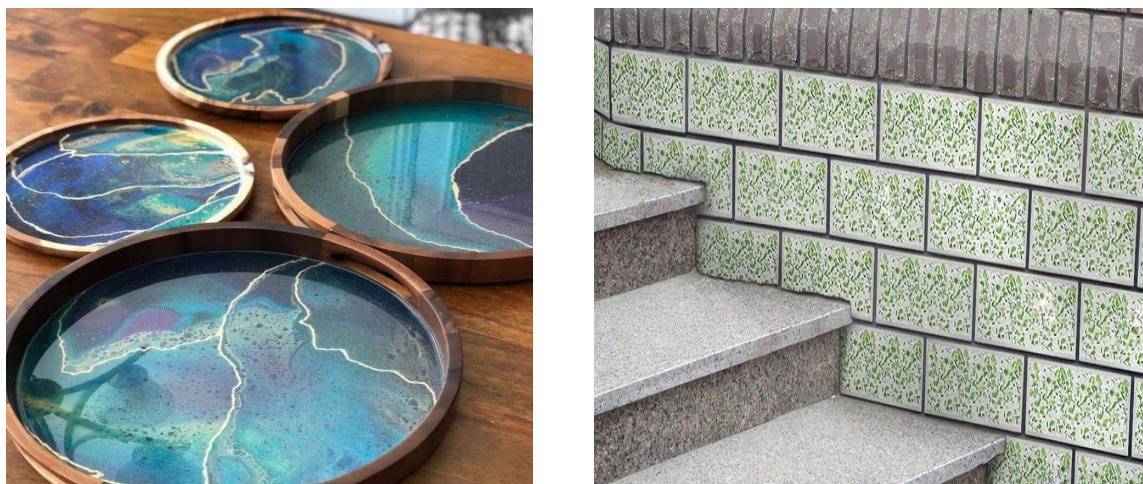


Figure 2. Glass tiles.

#### 5. Production technology

The task of fastening the elements is taken over by the adhesive polymer composition. The dispersion of glass particles is 2-3mm. To achieve the required fraction sizes, mechanical and automated crushers are used.

The technological process for producing such tiles is much simpler than when producing tiles by cutting sheet materials and then applying decorative patterns. The process of glazing or enameling does not require and does not involve stages [7].

The tiles we produce from glass waste has a number of advantages. Glass tiles are facing and are produced with the aim of transforming and improving the interior, giving it style and adding shine, in the literal sense of the word.

It is worth considering them in more detail. She:

- is durable;
- unpretentious in care;
- has excellent external characteristics;
- not afraid of moisture;
- temperature resistant;
- safe to use.



**Figure 3.** Production technology.

## 6. Conclusion

The production of construction materials from waste has both environmental and economic benefits. This is a promising direction for the development of the construction

industry, which allows us to solve environmental problems and at the same time increase the profitability of production.

### References

1. Nichola J. Coleman. International Journal of Environment and Waste Management. – 2011. – Vol.8. – No. 3-4. – P.366-382.
2. Liebau F. Structural chemistry of silicates. – M.: Mir, 1988. – 412 p.
3. Lebedeva E.Yu., Kobyakova A.A., Usova N.T., Kazmina O.V. // News of Tomsk Polytechnic University. – 2014. – Т.324. – No. 3. – P.137-141.
4. Grachev V.A., Nikitin A.T., Fomin S.A. and etc. Management of production and consumption waste in the environmental safety system: scientific and methodological manual / Ed. ed. corresponding member RAS, prof. V.A. Gracheva and prof. A.T. Nikitin. – M.: Publishing house MNEPU, 2009. – 500 p.
5. Belyuseva L. Receiving recyclable materials in a new way // Science and life. – 2007. – No. 3. – P. 48-49
6. Eldyshev Yu.N. Will the “garbage” mentality change? // Ecology and life. – 2007. – No. 9. – P. 25-27.
7. How “they” deal with garbage // Ecology and life. – 2008. – No. 7. – P. 68.