

Ecological aspect of brick production in the development of the territory

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Abstract. This article is devoted to the ecological problem of brick production. The negative effects on the environment, which are associated with emissions of dust, gases, noise and other factors, are considered. Methods of reducing harmful emissions and monitoring compliance with environmental standards in the production of bricks were also presented. The positive aspects of brick production are described, such as durability and environmental friendliness of products, as well as high demand for this material in construction. In conclusion, the author summarizes the results and notes the need for wider implementation of environmental standards in the production of bricks.

1 Introduction

Atmospheric pollution is the process of introducing various harmful substances into the atmosphere, such as toxic gases, dust, vapors, aerosols and other substances. These substances can come from both natural sources, such as forest fires and volcanoes, and from human activities, such as production, transportation, fuel combustion and other industrial processes. Atmospheric pollution has many negative consequences for human health and the environment. Toxic gases such as nitrogen and sulfur oxides can cause breathing problems, as well as contribute to the formation of smog and acid rain. Emissions of carbon dioxide and other greenhouse gases into the atmosphere can enhance the greenhouse gas effect and lead to climate change and global warming.

Various methods are used to combat atmospheric pollution, such as the use of cleaner fuels and low-emission technologies, energy efficiency improvements, the transition to renewable energy sources, as well as the introduction of various regulations and legislative measures [8,6]. In the modern world, atmospheric pollution is a serious problem that requires immediate attention and action. Every year millions of people around the world suffer from diseases related to atmospheric pollution, and this problem has a huge impact on our environment.

One of the main sources of atmospheric pollution is industrial enterprises. It is necessary to create enterprises to use low-emission technologies, oblige them to install purification systems and take measures to control their emissions. Also, we must continue to research and develop new technologies that can help reduce atmospheric pollution.

In the modern world, the ecological crisis is becoming more and more urgent and affects many aspects of life on the planet. One of the main aspects of the ecological crisis is atmospheric pollution, which is a serious threat to human health and the environment. Atmospheric pollution is caused by emissions of harmful substances into the atmosphere from various sources, such as industrial enterprises, transport and household facilities. As a

result, dangerous substances such as sulfur dioxide, nitrogen dioxide, carbon dioxide, methane and others accumulate in the air. These substances have a harmful effect on human health, as well as lead to climate change and destruction of ecosystems [5,6].

In this text, we will consider the causes and consequences of atmospheric pollution, as well as ways to solve this problem.

2 Materials and methods

The strategy of socio-economic development of the Abatsky municipal district, like any other strategy, provides for certain priority areas, the implementation of which all efforts and resources are directed. However, in this case, it should be noted that the implementation of these priority areas will give a complex synergetic effect. This means that the implementation of some areas will form the prerequisites for the comprehensive implementation of all other initiatives, which in turn will accelerate and strengthen the overall development process.

The focus on creating new jobs, improving the quality of people's lives, infrastructural development and improving the transport connectivity of the territory are common to all priority areas. At the same time, they play a crucial role in the development of the district. The key factor of development is the development of investment platforms and the introduction of investor support mechanisms. This will attract more investments, create new jobs, develop infrastructure and improve the quality of life of local residents [2,6,8,12].

- Infrastructural development of municipal investment sites suitable for the implementation of planned priority investment projects;
- organization of information interaction and working contacts with potential investors in the strategic interests of the municipal district;
- implementation in practice of municipal-private partnership (MCHP);
- development of municipal infrastructure to support small businesses;
- implementation of the best practices of municipal management of the investment process.

The essence of municipal-private partnership is the cooperation of the public or municipal sector with private companies in order to achieve certain goals. Such a partnership may include various forms of cooperation, for example, joint implementation of projects, exchange of experience and knowledge, joint financing, joint operation of facilities, etc. It can be used in various fields, such as the construction of roads, housing and communal services, transport infrastructure, social facilities, and others.

The main advantages of municipal-private partnership are:

- Risk allocation (risks are distributed between the public and private sectors. This allows you to reduce risks and increase confidence in the successful implementation of projects);
- Resource sharing (combining the resources of the public and private sectors in the implementation of projects, which reduces the costs of their implementation and ensures efficient use of resources);
- Improving the quality of projects (using advanced technologies, experience and knowledge that private companies have, which can improve the quality of projects and their competitiveness);
- Increased transparency (the MCHP provides for the use of open procedures for the selection of private partners, which ensures transparency in the selection and control of the implementation of projects);

- Business development (creating conditions for the development of small and medium-sized businesses, which can contribute to an increase in the number of jobs and economic development).

The territory of the Abatsky district is located in the southeastern part of the Tyumen region. The area of the district is 4.08 thousand km². The structure of the district is represented by eleven rural settlements, which include 65 settlements. Geological exploration on the territory of the municipal district revealed 8 deposits of brick clays suitable for the manufacture of high-quality ceramic bricks. When analyzing territorial planning documents, it was found that in accordance with the Master Plan of the Bannikovskiy rural settlement of the Abatsky district of the Tyumen region, an investment site is provided for the development of a clay quarry with the possible construction of a capital construction facility for the production of bricks [4,5,1].

The most suitable for the implementation of an investment project for the production of building materials is the Tyumen region, Abatsky district, Bannikovo village, Tsentralnaya str., 45 a. with cadastral No.72:01:0201001:174. The construction of a mini-plant in the Abatsky district has an important strategic development. Today's society increasingly prefers modern technological development. Currently, it is envisaged that the technological direction will be primarily developed, ensuring a reduction in metal consumption, cost and labor intensity of construction, technical re-equipment of brick production based on the latest technology.

The technological process of ceramic brick production is based on a cycle that includes several stages. The initial one is the preparation of raw materials. During this period, the clay and other components are crushed, mixed in the right ratio and the mass is prepared for the next stages. Next is the molding. At this stage, the prepared mass is fed into special equipment that forms bricks of the desired shape and size. Bricks are dried in the open air to a certain degree of readiness. The next stage is firing. Dried bricks are fired in special furnaces. This allows you to fix the structure and shape of the brick, giving it the necessary properties of strength and resistance to external factors. The final stage is packaging and shipment. After firing, the bricks are subjected to quality control, packed and sent to the warehouse for subsequent shipment to the consumer [13,6]. The duration of the production cycle depends on many factors, such as production capacity, type of equipment used, technical characteristics of raw materials, etc. Optimization of the production cycle makes it possible to increase labor productivity, reduce production costs and increase the competitiveness of products. Brick production is one of the important sectors of the construction industry, which has significant relevance and significance in various countries of the world. Brick is used for the construction of buildings, houses, structures, roads, bridges, etc. and is one of the main materials necessary for the development of infrastructure and improving the quality of life of people. Brick production provides many jobs and contributes to the development of the district's economy. In addition, brick factories and enterprises are an important source of tax revenue for the state [10,11].

An important factor is also the environmental safety of brick production, which is achieved through the use of modern technologies and equipment, as well as compliance with strict environmental standards and regulations.

3 Results

Brick production has both positive and negative environmental aspects. On the one hand, brick is an environmentally friendly and durable material that does not emit harmful substances and does not pollute the environment. In addition, bricks can be recycled, using it to create new building materials, which reduces the amount of waste and reduces the environmental burden.

However, the brick production process can also have a negative impact on the environment. The production of bricks requires natural resources, including clay and wood fuel for firing bricks. Clay mining can lead to disruption of natural ecosystems, and the use of wood fuel can lead to deforestation and a decrease in the amount of oxygen in the atmosphere. In addition, the brick firing process can be accompanied by emissions of harmful substances into the atmosphere, which can negatively affect the health of people and the environment [2,4,7,12].

To reduce the negative impact of brick production on the environment, modern technologies and methods can be used, such as the use of electricity instead of wood fuel, recycling of production waste, reducing emissions of harmful substances, etc. But also, it is possible to use more environmentally friendly materials for the production of bricks, for example, using waste from the production of glass, metal, etc.

During brick production, a significant amount of dust can be released, which can be harmful to the environment and human health. This dust may contain various pollutants, such as quartz, silicates, heavy metals, carbon, etc. The dust released as a result of brick production can have a negative impact on the environment. In particular, it can pollute the atmosphere, pollute the soil and reservoirs, and also affect the animal and plant world. Dust can also be harmful to human health, especially for brick factory workers. Inhalation of dust can lead to various diseases of the lungs and respiratory tract, as well as eye and skin irritation.

To reduce the harmful effects of dust in brick production, various measures are used, such as water cooling of materials, the use of ventilation and dust extraction systems, as well as the use of personal protective equipment for workers. There are also measures to monitor air and water quality in the vicinity of brick factories.

The concentrations of harmful substances allowed in the production of bricks depend on local legal regulations and standards. Usually these standards are established on the basis of international and national standards that take into account the impact on the environment and human health. For example, the standards for emissions of nitrogen oxides (NO_x) for brick production in the European Union are up to 500 mg/m³, and for emissions of sulfur oxides (SO_x) – up to 200 mg/m³. In Russia, the emission limits for various substances are regulated by Federal Norms and Regulations (FNPAEP), which also set permissible limits for the concentration of pollutants [1,3,8,11]. However, it should be noted that there are strict requirements for environmental safety and health of workers in the production of bricks, and violation of these requirements can lead to serious sanctions from government agencies.

In general, during the construction of a brick factory, it is necessary to carefully study local environmental conditions, legislation and regulations, as well as take measures to reduce harmful emissions and environmental pollution as much as possible. Depending on the concentration of air dust in the work area at work, it can be classified as hazardous to the health of workers. To do this, there is a table of dust hazard classes, which is presented below (Table 1)

Table 1. Formatting sections, subsections and subsubsections.

Hazard class	Dust concentration, mg/m ³
1 (low)	up to 1.0
2 (moderate)	1.1 – 3.0
3 (high)	3.1 – 10.0
4 (very high)	over 10.0

Industrial dust is small solid particles formed during the production activities of various industries. Depending on the industry and production technology, dust may have different components and properties. Some of the types of industrial dust:

- Metal dust: it is formed during the processing of metal and its alloys, for example, in metalworking workshops.
- Stone dust: it is formed during the extraction and processing of stone, as well as in the production of ceramic products, for example, in the production of bricks.
- Wood dust: it is formed during the processing of wood, for example, in the production of furniture, paper, etc.
- Rubber dust: it is formed in the manufacture of rubber products, for example, in the manufacture of automobile tires.
- Chemical dust: formed in the production of chemicals, for example, in the production of pesticides, fertilizers, etc.
- Dust from fuels and lubricants: formed during the production and use of fuels and lubricants, such as gasoline, oils, etc.

4 Discussion

Brick production remains in demand in the construction industry in many countries of the world, including Russia. This is due to the fact that brick is one of the most common and reliable materials for the construction of buildings and structures. One of the main advantages of brick is its durability. Brick buildings and structures can last for several decades or even centuries without losing their operational properties. The brick also has high strength and resistance to various external influences, such as mechanical shocks, moisture and temperature changes. Brick is also an excellent thermal insulation material, which allows it to be used for the construction of buildings with high energy efficiency. Due to its thermal insulation properties, brick can significantly reduce the cost of heating and air conditioning in a building. In addition, the brick has excellent sound insulation properties, which allows it to be used for the construction of buildings located in noisy and urban conditions. Brick walls have a high thermal insulation ability, which allows you to reduce heating costs and keep warm indoors. This in turn reduces greenhouse gas emissions associated with the production of energy for heating.

One of the main advantages of brick production from an ecological point of view is the use of natural materials, such as clay and water, in the production process. Unlike artificial materials, the production of which requires high energy consumption and is accompanied by emissions of harmful substances into the atmosphere, brick factories pollute the environment less. Brick production also contributes to the creation of jobs in local communities and the development of the region's economy. A brick factory can attract labor from local settlements and contribute to the development of small and medium-sized businesses associated with the production and supply of raw materials for the plant.

In general, brick production, if it is carried out in compliance with environmental standards and norms, can be a useful and effective way of producing building materials that contributes to the conservation of natural resources and contributes to the economic development of the region.

5 Conclusion

In conclusion, it can be noted that brick production, like any other industry, has its advantages and disadvantages. However, if we take into account the growing demand for housing and building materials, as well as taking into account the need for environmentally

friendly and safe production processes, brick production remains relevant and in demand. It is important to note that minimizing the negative impact on the environment in brick production is possible through the use of modern technologies and equipment, as well as compliance with strict environmental standards and regulations. Among other things, the development of brick production contributes to the economic development of the region, the creation of new jobs and improving the welfare of the population. The construction of a brick factory for the municipal district will create jobs and investment attractiveness for small businesses, as the need for high-quality environmental materials is quite high.

Thus, brick production can be a successful and profitable industry, provided that environmental standards are met, production efficiency is improved and market needs are met.

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