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Research on construction waste treatment and resource utilization technology in the process of urbanization

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Abstract: With the rapid advancement of urbanization, the amount of construction waste is increasing year by year, which has become an important issue in urban environmental governance and resource utilization. This paper aims to study the treatment technology and resource utilization method of construction waste. A technical scheme, including classification collection, crushing and screening, and resource utilization, has been proposed through the analysis of the current situation of construction waste treatment. This paper focuses on the recycling technology of concrete, brick and tile materials in construction waste, and the application effect of these technologies in practical engineering. The research results show that through scientific treatment technology and resource utilization means, construction waste can not only effectively reduce the negative impact on the environment, but also can be transformed into valuable renewable resources, providing strong support for the sustainable development of the city.

1. Introduction

With the acceleration of the global urbanization process, the construction industry has developed rapidly, but it has also brought about a large number of construction waste problems. The garbage not only occupies the land, affects the appearance of the city, but also may cause harm to the environment and human health. How to effectively deal with and recycle these construction waste has become an important challenge facing the current society.

The traditional way of construction waste treatment is mostly simple landfill or stacking in the open air. This way not only cannot solve the garbage problem, but may cause a series of environmental problems, such as soil and water pollution, resource waste and so on. Therefore, it is particularly important to study the new construction waste treatment and resource utilization technology.

This paper aims to deeply study the treatment and resource utilization technology of construction waste in the process of urbanization, explore how to transform these wastes into valuable renewable resources, realize the effective recycling of resources, and promote the sustainable development of the city.

Through this research, we hope to provide scientific basis and technical support for the treatment and resource utilization of construction waste, and promote the green, environmental protection and sustainable development of urban construction.

2. Sources and characteristics of construction waste

2.1 The main source of construction waste

Construction waste refers to the waste generated in the process of building construction, maintenance and demolition, mainly including earthwork, concrete blocks, bricks and tiles, wood, glass, metal and other wastes. These wastes mainly come from the following aspects:

Residential and public building construction: In the construction process of residential and public buildings, a large amount of construction waste will be generated. This waste mainly comes from the excavated earthwork, abandoned building materials and waste generated during the construction process[1].

Commercial and industrial building construction: In the construction process of commercial and industrial buildings, a large amount of construction waste is also generated. The waste includes the excavated earthwork, the abandoned building materials and the waste materials generated during the construction process.

Building maintenance and renovation: Over time, the maintenance and renovation of residential, public, and commercial buildings are inevitable.In these processes, a large amount of abandoned building materials and decoration materials, such as old doors and windows, wallpaper, and flooring, are generated.[2]

Building demolition: When a building is demolished, large amounts of construction waste are generated. These waste mainly includes concrete blocks, bricks and tiles, wood and other waste. In the process of demolition, there will also be some hazardous waste, such as waste containing asbestos and waste electrical lines.

Road construction and maintenance: In the process of road construction and maintenance, a large amount of construction waste is produced and produced. The waste mainly comes from the excavated earthwork, abandoned building materials and waste generated during the construction process.

To sum up, construction waste comes from a wide range of sources, mainly including residential and public building construction, commercial and industrial building construction, building maintenance and renovation, building demolition, and road construction and maintenance[3]. The garbage not only occupies the land, affects the appearance of the city, but also may cause harm to the environment and human health. Therefore, how to effectively deal with and recycle these construction waste has become an important challenge facing the current society.

2.2 Characteristics of construction waste

Large quantity: With the acceleration of urbanization and the prosperity of the construction industry, the production of construction waste increases year by year. At all stages of the construction project, such as construction, maintenance, renovation and demolition, large amounts of waste are generated. According to statistics, the amount of construction waste has accounted for 30% to 40% of the total municipal waste.

Complex composition: construction waste has a complex composition, including earthwork, concrete blocks, bricks and tiles, wood, glass, metal and other wastes. The physical and chemical properties of these components are different, and it is difficult to treat and use them.

Difficult disposal: Due to the complex composition of construction waste, its disposal methods are also more diverse[4]. Traditional landfill and open-air stacking methods not only occupy a lot of land, but may also cause soil and water pollution. In addition, some construction waste (such as concrete blocks and bricks and tiles) is harder and more difficult to deal with.

Great potential for resource recovery: although it is difficult to dispose of construction waste, its

resource recovery potential is huge. Many building materials (such as concrete blocks and bricks and tiles) can be broken, screened and recycled before being used again in construction projects. This can not only reduce the exploitation of new materials, reduce the environmental load, but also realize the effective recycling of resources.

Regional and temporal characteristics are obvious: the generation of construction waste is closely related to regional economic development, population distribution and construction activities. The composition and quantity of construction waste may vary greatly in different regions and at different times. This requires the corresponding treatment and resource utilization technology according to different situations[5].

Safety risks: Some construction waste (such as waste containing asbestos and waste electrical lines) may have safety risks. In the process of treatment and resource utilization, corresponding safety measures need to be taken to prevent accidents.

To sum up, construction waste is characterized by large quantity, complex composition, difficult treatment, great resource potential, obvious regional and temporal characteristics, and potential safety risks. These characteristics make the treatment and resource utilization of construction waste become a complex and important task.

3. Construction waste treatment and resource utilization technology

3.1 Classification and collection of construction waste

Before dealing with construction waste, it needs to be classified and collected first. This step is crucial for the subsequent resource utilization.

Classification: The composition of construction waste is complex and requires careful classification. In general, the waste can be classified according to its composition, particle size, and use. For example, waste such as earth, concrete blocks, bricks, wood, glass and metal should be collected separately. For the same type of waste, further subdivision can be made according to the particle size, such as concrete blocks can be divided into large concrete and broken concrete[6].

Collection: On the basis of classification, appropriate containers and equipment shall be used for collection. For different categories of waste, different collection containers should be used to avoid cross-contamination. In addition, the collection points should be reasonably arranged to facilitate the delivery of garbage and minimize the impact on the surrounding environment.

In order to improve the utilization rate of construction waste, residents and construction units should be encouraged to actively participate in the classification and collection of construction waste. The participation of the relevant parties can be increased through publicity and education, and the provision of appropriate incentives.

In addition, the government and relevant departments should formulate a strict construction waste management system, clarify the responsibilities and obligations of all parties, and ensure the smooth progress of the classification and collection work. At the same time, the supervision should be strengthened, and the violation of the regulations should be punished to maintain the order of construction waste management.

To sum up, the classification and collection of construction waste is an important prerequisite for realizing resource utilization. Only through careful classification and collection can it provide guarantee for the subsequent treatment and resource utilization. Therefore, we should pay attention to and strengthen the work of this link to promote the sustainable development of construction waste.

3.2 Crushing and screening technology

Crushing and screening is one of the key technologies in construction waste treatment. It is mainly used to break different components of construction waste into smaller particle sizes and screen them for subsequent resource utilization. This technique mainly includes two steps: crushing and screening[7].

Fragmentation: the purpose of crushing is to break the bulk waste of construction waste into a smaller particle size, so as to facilitate the subsequent treatment and resource utilization. The crushing equipment can be selected according to the nature of the waste and the requirements of resource utilization. Commonly used crushing equipment includes jaw crusher, counterattack crusher and hammer crusher. These devices break the waste into the desired particle size by means of impact, squeezing or cutting. The crushing degree should be controlled in the crushing process to avoid increased energy consumption and resource waste caused by excessive crushing.

Screening: The purpose of screening is to classify the broken waste according to the particle size. Screening equipment can be selected according to the requirements of resource utilization. The commonly used screening equipment includes vibrating screen and drum sieve. The vibrating screen vibrates the waste on the sieve surface through vibration, so that the waste of different particle sizes falls into different collectors respectively. The roller sieve is to bring out the waste through the rotating drum, and the waste of different particle sizes is separated in the rotating movement of the drum. The screened waste can be classified according to the particle size and used for different resource utilization routes respectively.

The crushing and screening technology is of great significance in the construction waste treatment. First of all, through crushing and screening, the different components of construction waste can be effectively separated to improve the efficiency of resource utilization. Secondly, crushing and screening technology can reduce the volume and quality of construction waste and reduce the burden on the environment. In addition, crushing and screening technology can also provide high-quality raw materials for the production of recycled products and promote the recycling of construction waste.

In order to improve the effect of crushing and screening technology, the appropriate crushing and screening equipment should be selected, and the process parameters should be adjusted according to the actual situation. At the same time, it is important to strengthen the maintenance and maintenance of equipment to ensure the normal operation of the equipment.In addition, attention should be paid to technology research and development and innovation to promote the progress and development of crushing and screening technology[8].

To sum up, crushing and screening technology is an important link in construction waste treatment, which is of great significance for improving the utilization rate of construction waste resources and promoting the sustainable development. In the future, the research and application of crushing and screening technology should be strengthened to provide more efficient and environmentally friendly technical support for the treatment and resource utilization of construction waste.

3.3 Resource utilization technology

Resource utilization technology is the process of transforming construction waste into renewable resources, which is the key to solve the problem of construction waste. Here are some of the major resource utilization technologies:

Relaimed concrete technology: recycled concrete is the waste concrete block after crushing, screening and cleaning, as aggregate, cement, water and other new concrete. This technology can significantly reduce the production of new concrete and reduce resource consumption and

environmental load. The performance of recycled concrete is comparable to that of natural aggregate concrete, and it has good durability and compressive strength[9].

Reclaimed brick technology: recycled brick is the waste concrete blocks, bricks and tiles after crushing, screening and pressing, made into new bricks. This kind of brick can replace the traditional clay brick and has better compressive strength and durability. The production process of recycled bricks has low energy consumption, and can reduce the dependence on natural resources.

Other resource recovery products: In addition to recycled concrete and recycled bricks, construction waste can also be recycled in other ways. For example, discarded wood, glass, and metal can be recycled and reused separately. After proper treatment, these wastes can be converted into valuable products, such as wood-plastic composites, glass products and metal products.

In order to improve the utilization rate of construction waste resources, a series of measures need to be taken. First of all, publicity and education should be strengthened to improve the public's awareness of the recycling of construction waste. Secondly, a sound construction waste recycling system should be established to ensure that the waste can be timely and effectively collected and treated. In addition, technology research and development and innovation should be strengthened to improve the technical level of construction waste resource utilization. The government should formulate relevant policies to encourage and support the recycling of construction waste, and provide preferential measures in terms of funds and taxation.

Resource utilization technology can not only help to solve the problem of construction waste, but also can promote the sustainable development of the economy. Through the recycling of construction waste, new employment opportunities can be created and promote the development of related industries. At the same time, the production and application of recycled products can reduce the demand for raw materials, reduce production costs, and reduce the negative impact on the environment.

To sum up, the resource utilization technology is the key to solve the problem of construction waste. Through scientific and reasonable utilization and treatment, construction waste can be transformed into valuable renewable resources and make contributions to the sustainable development of the city[10]. In the future, we should continue to strengthen the research and application of resource utilization technology, and provide more advanced and environmentally friendly technical support for the treatment and resource utilization of construction waste.

4. Conclusion

In the process of urbanization, the treatment and resource utilization of construction waste are an important issue. With the continuous expansion of the city scale and the rapid development of the construction industry, the production amount of construction waste is increasing year by year, which brings great pressure to the environment. Therefore, how to effectively deal with and recycle the construction waste has become an urgent problem to be solved.

This paper analyzes the source and characteristics of construction waste, and focuses on the classification and collection, crushing and screening technology and resource utilization technology of construction waste. Through scientific and reasonable classification and collection, the crushing and screening technology can break the different components of the construction waste into smaller particle sizes, and facilitate the subsequent resource utilization. The resource utilization technology is to transform the broken construction waste into valuable renewable resources, such as recycled concrete, recycled bricks, etc. These recycled products can replace traditional materials, reduce dependence on natural resources, reduce production costs, and reduce the negative impact on the environment.

In order to improve the utilization rate of construction waste resources, a series of measures need

to be taken. First of all, publicity and education should be strengthened to improve the public's awareness of the recycling of construction waste. Secondly, a sound construction waste recycling system should be established to ensure that the waste can be timely and effectively collected and treated. In addition, technology research and development and innovation should be strengthened to improve the technical level of construction waste resource utilization. The government should formulate relevant policies to encourage and support the recycling of construction waste, and provide preferential measures in terms of funds and taxation.

To sum up, the research on construction waste treatment and resource utilization technology is of great significance in the process of urbanization. Through scientific and reasonable treatment and resource utilization technology, it can effectively solve the problem of construction waste and promote the sustainable development of the city. In the future, we should continue to strengthen the research and application of relevant technologies to be used to provide more advanced and environmentally friendly technical support for the treatment and resource utilization of construction waste. At the same time, the government, enterprises and the public should make joint efforts to promote the reduction, recycling and harmless treatment of construction waste, so as to contribute to the construction of a beautiful China.

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