

Research on the Mechanism and Path of Carbon Neutrality with the Help of Construction Waste Resourceization

-- Bengbu City as an Example

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Abstract

In recent years, China's construction waste is mainly landfill in a single way, taking up a lot of land resources, especially mixed with domestic waste after the construction waste treatment is more complex, it is easy to cause construction waste around the city. However, China's green building development system is not perfect, construction waste control is still inadequate, construction waste can be effectively treated only 5%. The control of construction waste affects the overall development of China, and it is crucial to explore effective construction waste treatment methods and propose practical solutions to promote carbon neutrality. Finally, we draw conclusions from a survey on the recycling and utilization of construction waste in four aspects: awareness, willingness to use, influencing factors and development prospects, and make suggestions based on the governmental level, social level, rural level, urban level and individual level, hoping to promote the civilized development of China's ecological field.

Keywords

Construction Waste; Carbon Neutrality; Resourcefulness.

1. Research Background

1.1. Policy Background: Construction Waste Resourceization

In the 14th Five-Year Plan, the Chinese government proposed to "implement waste separation, reduction and resource recovery". Accelerate the construction of waste material recycling system." The State Council proposed in its "Opinions on Further Strengthening Urban Planning and Construction Management" that the waste recycling rate should be increased to over 35% by 2020. The report of the 19th Party Congress also clearly proposed "strengthening solid waste and garbage disposal", and the 4th Plenary Session of the 19th Party Central Committee proposed "comprehensively implementing a garbage classification and resource utilization system".

In 2012, the "Twelfth Five-Year Plan" for waste recycling technology projects was introduced, accelerating the development of third-party technology and operation services for waste recycling; in 2013, the "Green Building Action Plan" was launched, requiring prefecture-level cities to establish construction waste treatment bases as soon as possible; in 2014, the "Important Resource Recycling Projects Implementation Plan" to encourage the research and development of equipment and technology for construction waste classification and recycling; on May 25, 2017, the "Thirteenth Five-Year Plan" for China's urban infrastructure construction clearly proposed to improve the waste collection and treatment system and enhance the level of utilization of waste resources. In 2019, the industry report "Technical Standards for Construction Waste Disposal" will be introduced to regulate construction waste disposal standards. 2020, the "Guidance on Promoting Construction Waste Reduction" will be

introduced to promote the transformation and development of the construction industry and green building with construction waste reduction.

From February 2019, in order to strengthen the management of urban construction waste to ensure environmental health and cityscape, thereby enhancing the degree of construction waste resourcefulness, according to the Law of the People's Republic of China on the Prevention and Control of Solid Waste Pollution of the Environment, the Regulations on the Management of Urban Construction Waste and related laws, regulations, rules and regulations, the Measures for the Management of Urban Construction Waste in Bengbu City (hereinafter referred to as "Measures") came into effect. The "Measures" mainly applies to the city's urban construction waste collection, transportation, transfer, backfill, consumption, utilization and other disposal management activities.

1.2. Background of the Times: Construction Waste Resourceization is Inevitable

Along with China's expanding urban area and increasing urbanization level, the demolition and renovation of old urban areas and land level development of new urban areas have made the construction and demolition area of China stable at a high growth rate in the past 10 years. During the "13th Five-Year Plan" period, the total national investment in the construction of facilities for the sound treatment of urban construction waste reached 251.84 billion yuan. Among them, 169.93 billion yuan was invested in the construction of harmless treatment facilities, 25.78 billion yuan was invested in the construction of collection and transportation transfer system, 18.35 billion yuan was invested in special kitchen waste projects, 24.14 billion yuan was invested in stockpile remediation projects, 9.41 billion yuan was invested in waste classification demonstration projects, and 4.23 billion yuan was invested in the construction of supervision system.

Such a huge amount of construction waste, if not treated and utilized in a planned way, will have a bad impact on our soil, natural ecological environment and groundwater. At present, China has not diversified the way to deal with construction waste, and the main method is landfill. This method of construction waste disposal not only takes up a lot of financial funds for land acquisition, but also occupies a lot of land, especially a large amount of construction waste is abandoned to landfills, and when mixed with domestic waste will become more difficult to deal with. In view of the above negative effects, measures for construction waste recycling are very important.

1.3. Field Survey: The Current Situation in Bengbu

In the investigation of construction waste in Bengbu City, it can be found that the main problems of construction waste disposal in Bengbu City mainly exist in the lack of construction waste disposal capacity, low management level and low level of resource utilization. The root cause of the problem is that Bengbu City is in a period of rapid development and the production of construction waste is large, leaving many safety hazards. In addition, Bengbu city currently lacks dynamic monitoring of construction waste, construction waste dumping and piling occur occasionally, resulting in a lack of macro control over the amount of construction waste generated, treatment and disposal, backfill utilization, etc. Finally, the relevant laws and regulations on construction waste at the national level are not sound enough, resulting in low recycling rate of construction waste.

In order to improve the ecological environment of Bengbu City, the Bengbu Municipal Government has developed a policy on waste disposal from three sides of the building. First, the development of programs to promote legislative protection. Second, planning first, to promote the construction of the project. Third, the pilot first, to promote broad participation. According to the Ministry of Housing and Construction's "Notice on the Pilot Work of

Construction Waste Management", Bengbu was listed as one of the 35 pilot cities in China, and through the development of "Bengbu City Construction Waste Management Plan (2018-2030)" to strengthen construction waste management, protect urban amenities and environmental health, regulate the collection and transportation and harmless treatment, so as to improve the level of construction waste management. Among them, mainly related to the receiving site of residue and construction waste comprehensive utilization facilities, taking into account the needs of the city's construction waste treatment, the plan will set up a receiving site of residue in the south of Mohekou Intravenous Industrial Park, and build a comprehensive utilization facility of construction waste in Mohekou, which is expected to have an annual comprehensive treatment of 3 million tons of waste. The plan takes into account the general urban planning, spatial planning, sanitation planning and other important principles, and determines the population scale of the central city, the scale of land and other data basis, to create a comprehensive water clean shore green industry beautiful Yangtze River economic belt, and focus on building 1 km, 5 km, 15 km three lines of defense, accelerate the construction of ecological civilization, build a beautiful China construction of Anhui model.

2. Research Significance

2.1. Theoretical Significance

The problem of waste classification in China's construction industry has not been widely concerned, and the research on the concept of green building is also at a preliminary stage, and the systems and systems have not yet been completed, although a number of scholars and experts have conducted research on it, but in terms of the current situation, the control of construction waste in the construction industry still needs a lot of research. On this basis, the preliminary exploration of various control modes of construction waste with the background of green building concept will alleviate the lack of research results on this issue and promote the development of research in this area.

2.2. Practical Significance

The problem of construction waste pollution needs to be solved. With the rapid development of China's economic construction and old buildings gradually reaching the end of their service life, a large amount of construction waste is generated, and the emission is increasing year by year; and most of the construction waste is untreated and transported to the suburbs for simple landfill or open pile, which not only occupies a large amount of land, pollutes water, air and soil, but also causes a serious ecological crisis to the environment due to the leakage, dust and sand generated in the cleaning and piling. It is thus clear that the problems related to construction waste pollution must be solved faster. Resource utilization of construction waste is an inevitable trend. By recycling construction waste and then resourcing construction waste to achieve the purpose of secondary use, as a way to develop circular economy and build a beautiful China. Promoting the resource utilization of waste will have very important practical significance.

3. Literature Review

3.1. The Current Situation of Domestic Development

A preliminary analysis of the concepts involved in the development of construction waste was conducted, and problems were identified through the study of the current situation of construction waste, and methodological analysis was conducted through the exploration of domestic and foreign green development concepts and control models, in order to provide a theoretical basis for the solution of the problem.

1.Green Building Concept

Green building concept is an emerging architectural concept, which has not yet formed a complete theoretical system in China, and many scholars have put forward their views on its development status and solutions.

Cheng Li believes that China's green building development system is not perfect, technical support force is indeed, there is no effective evaluation mechanism yet, and the lack of regulations, which are the reasons why China's green building concept is difficult to progress rapidly; Liu Xiaojun believes that the challenges faced by China's green building include green building cognitive bias, the system system needs to be improved, and the incentives are not effective enough; Li Zeng believes that compared with developed countries, China's Green building development should be more combined with national conditions, formulate corresponding policies, and focus on the development of science and technology to play the advantages of energy saving. In addition, in the process of practicing the development of green building concept, it is also necessary to combine the development status of the whole industry to make adjustments.

Comprehensive views of the above scholars can be found that the green building concept in China is still in the preliminary stage, and the measures are not perfect. Firstly, the relevant legal system system needs to be formulated faster. Secondly, strengthening the management and implementing the green building concept will also promote the development of the industry.

2. Building Control Model

Zhao Lin, Ye Shuguang and Wang Qiang in "Research on the application of whole process control mode in construction project control" mentioned that the whole process management can play a key role in construction projects, including the procurement of building materials and the application of new technologies and materials in the pre-construction stage, the treatment control in the implementation stage, and the management in the completion stage will provide convenience for the development of the construction industry. Bo Shan, Kou Guangtao in the study of environmental management control mentioned the exploration of environmental cost management model through symbiotic theory, including the medium of funds, technology, knowledge and chanting to promote the high quality operation of the system and improve the control mechanism in the symbiotic environment and symbiotic interface of the great development.

In the exploration of the control model of construction industry, there are also many different scholars put forward the relevant concepts, thus it can be seen that the control analysis will play a role in promoting the high quality development of the construction industry.

3. The current situation of construction waste and its shortcomings

Xu Shaohao and Hao Runxia in "Construction Waste Resourcefulness Methods and Utilization Value" In the whole waste resourcefulness management, there are still many shortcomings, for example, the relevant parts do not pay enough attention to the waste resourcefulness treatment, and there is no sound leading management organization to provide comprehensive guidance to the construction waste resourcefulness this system of engineering; secondly, the technical level of resourcefulness treatment still needs to be strengthened, and most of the engineering Most of the managers adopt the way of landfill to deal with all the construction waste, and do not classify the waste and then deal with it. Lina Zhou and Yingchun Zhang analyze the shortcomings of domestic legislation in terms of the management and legislation of construction waste treatment in foreign countries, and put forward countermeasures and suggestions in order to promote the resourceful utilization of construction waste.

4. The necessity of construction waste management

According to statistics, construction waste accounts for about 30%-40% of the total waste, and according to the "China Construction Waste Resourceization Industry Development Report

(2014 Annual)", China's construction waste generation exceeded 1.5 billion tons in 2014, even reaching 2.4 billion tons. The report says this figure is still increasing year by year with the accelerated pace of urbanization and the increasing scale of construction.

Lu Zhongyi pointed out in "Difficulties of Construction Waste Disposal and Countermeasures" that construction waste is also a part of environmental pollutants, and some waste materials and construction waste that cannot be degraded in the short term, such as waste concrete, asphalt blocks, scrap metal and broken bricks and tiles, can cause environmental pollution and endanger human health. Construction waste has gradually become the "pain of the city", for construction waste disposal process may exist in the difficult problems, need to combine the actual analysis, but also to combine the law of recycling of some construction waste for scientific treatment and recycling.

3.2. Foreign Development Status

1. Construction waste management problem

The problem of construction waste has been long-standing and has been highly valued by experts and scholars at home and abroad. The United States, Japan, the European Union and other developed countries and regions of construction waste resource utilization than China's early start, mature technology, has basically realized the construction waste "reduction", "harmless", "resource" and "industrialization". The utilization rate accounts for about 95%. In the United States, recycled aggregates account for 5% of the total aggregates, about 68% of the recycled aggregates are used for road base and foundation, 6% for mixing new concrete and 9% for mixing asphalt concrete. Germany, Finland and other countries rely on its mining machinery base, the formation of a mature construction waste treatment process and complete sets of equipment.

At present, the world's largest construction waste treatment plant is located in Germany, which can produce 1200 tons of recycled construction waste materials per hour. Compared with Germany, Japan's construction waste resource utilization refinement degree is higher, the equipment belongs to the function is also more advanced and professional. Japan, the United States, Germany, the Netherlands, the United Kingdom and other developed countries, on the basis of experiments, have established corresponding norms and guidelines to regulate the application of recycled materials in building structures.

2. Risk control of foreign pollutants

Li Xiaonuo, Chen Weiping, and Lv Stan in "Progress of Research on Risk Control Technology System and Model of Contaminated Sites at Home and Abroad" precisely elaborated the current situation of contaminated site control at home and abroad. In the study of risk control of contaminated sites, selected US Superfund sites give relevant reports showing the application ratio of engineering control, institutional control, monitoring natural attenuation and other contamination risk control techniques in soil and remediation water increase.

In practical applications, engineering control techniques use artificial engineering measures to sequester pollutants and limit migration to achieve the risk of pollution exposure reduction, this control application means has a long history of application. For example, NEPA statistics show that 68% of the 511 site soil contamination management projects conducted in the United Kingdom from 2000-2013 used engineering control techniques for contaminated sites. The U.S. EPA Superfund remediation report shows that about 62% of the 1417 Superfund sites that implemented contaminant source remediation from 1982-2008 applied engineering control techniques.

In addition to these, institutional control techniques and monitoring natural attenuation techniques are also applied in practice as risk management application models.

4. Recommendations

4.1. Government Level

In terms of regulations, formulate and improve the relevant management regulations, strengthen the management of urban construction waste, and strictly regulate the processing standards of construction waste collection and transportation, transfer backfill and reuse in Bengbu city, including construction waste and renovation waste, and implement resource reduction to the maximum extent.

In terms of having a division, the establishment of the city's urban management administration and law enforcement departments, specifically responsible for organizing and coordinating construction waste disposal permits, resource-based reuse and other work. To achieve sub-domain jurisdiction, the relevant law enforcement departments are responsible for the specific work of construction waste management and administrative penalties within their jurisdictions.

In terms of policy, the implementation of financial subsidies, preferential loans, tax reduction policies and other aspects of effective incentives in the field of green and energy-efficient construction to guide and support the provision of rewards and punishment methods to regulate and constrain the interests of all parties must actively participate.

In terms of deployment, strengthen the style, do a good job of personnel protection, to ensure that the materials, vehicles, equipment, funding and other resources required to engage in the remediation of construction waste resource utilization work in place, the implementation of the protection of urban environmental health.

4.2. Social Level

In terms of technology, establish and improve the visualization and classification of the collection and transportation and treatment technology system. Good construction waste management needs a good set of economic, social and moral incentive system and reliable technical support.

In terms of background, based on the current situation of increasingly serious global environmental problems and China's basic national conditions, we will vigorously promote the development of the field of recycling and resource utilization of construction waste, implement green building practices and promote the improvement of global environmental quality.

In terms of scientific research, we will strengthen academic exchanges and cooperation, and focus on applied research. We can open up the topics and research projects to relevant universities and research institutes to seek wider benefits.

In terms of public opinion, widely carry out publicity, education and training on construction waste recycling, so as to make the concept of waste resourcefulness deeply rooted in people's hearts and form a strong public opinion atmosphere.

4.3. Rural Level

In terms of measures, compared with cities and towns, there are problems such as late start of waste recycling in rural areas, unsound infrastructure and low education level of residents. It is possible to adopt different forms of publicity and encouragement measures according to local conditions, strengthen farmers' responsibilities and obligations, and enhance information transparency and feedback mechanisms.

In terms of training, continue to promote household publicity and training, such as the use of on-site training sessions, media publicity, point rewards, TV commercials, quarterly evaluations, paid recycling and other incentives to widely promote knowledge of waste resource recovery to farmers, etc.

In terms of equipment, treatment cost is a factor that must be considered in the classification and reduction work. The high one-time investment cost of equipment for rural construction waste recycling and reuse treatment systems and the serious decentralization of small waste treatment sites lead to higher costs per unit treatment volume. And small equipment needs to meet the actual demand by increasing the number of treatment stations, making it difficult to obtain economies of scale.

In terms of planning, the arrangement of reduction and resource treatment sites should be moderately centralized to reduce the required O&M manpower input for the treatment of perishable waste per unit. In terms of technology, eliminate the use of high-temperature drying type treatment equipment and promote push-flow type bio-enhanced decomposition equipment to reduce the energy consumption of equipment operation.

4.4. Town Level

In terms of planning, comprehensive and scientific planning is the basis for deciding the effectiveness of urban waste recycling, and it is also a strong guarantee for the promotion of sorting, reducing and recycling work. In this kind of problem, it is necessary to ensure the landing of classification and treatment facilities through planning and design, and to open the chain of classification and transportation and collection and treatment systematically.

In terms of coordination, strengthen the overall planning and promote common construction and sharing. According to the principle of regional sharing, the construction of perishable waste in situ resource treatment sites should be planned and arranged according to local conditions, so that the whole town can be built in a coordinated manner to improve the effectiveness of waste classification and reduction and resourcefulness, and to realize the integrated common development of urban and rural areas.

4.5. Personal Level

In terms of awareness, enhance their own awareness of environmental protection, learn the relevant professional knowledge of waste reuse and resourcefulness, and implement it into daily actions. Once enough awareness is formed in the small environment, more people can be subconsciously involved in the remediation of garbage reuse through their own personal actions.

In terms of training, for different groups, we will organize professional training for communities, enterprises and institutions, primary and secondary schools, etc., so as to increase the participation of residents in the process of waste treatment and resource recovery, and make them feel involved in the process of construction waste resource recovery.

5. Conclusion

The energy consumption and carbon emissions in the production of construction waste are large. In order to reduce energy consumption, the secondary use of construction waste can be achieved through centralized recycling. At the same time, the introduction of market-based economy to ensure the stable development of the industry, to promote the development of circular economy, to make use of construction waste as a resource, to promote the reduction of energy consumption, to help China's carbon neutrality, for the construction of a beautiful China. Promoting the resource utilization of waste will have a very important practical significance.

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References

- [1] YangyueSu, HongyunSi, JianguoChen, Guangdong Wu. Promoting the sustainable development of the recycling market of construction and demolition waste: A stakeholder game perspective[J]. Journal of Cleaner Production, 2020.
- [2] Sourabh Jain, ShaleenSinghal, Nikunj Kumar Jain, Kalyan Bhaskar. Construction and demolition waste recycling: Investigating the role of theory of planned behavior, institutional pressures and environmental consciousness[J]. Journal of Cleaner Production,2020,263.
- [3] KamyarKabirifar, MohammadMojtahedi, ChangxinWang, Vivian W.Y. Tam. Construction and demolition waste management contributing factors coupled with reduce, reuse, and recycle strategies for effective waste management: A review[J]. Journal of Cleaner Production,2020,263.