

# Enlightenment of Japan's Breakthrough Way of NIMBY Problem in Domestic Waste Treatment to China

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**Abstract.** Properly solving the problem of garbage disposal is not only very important for building a livable city, but also an important part of realizing green and low-carbon circular development. How to break through the NIMBY dilemma to meet the needs of urban development and public service needs of residents' lives is a practical problem faced by government departments and scientific research. Based on the successful case of "building waste treatment facilities aimed at creating new value for the region" proposed by the Ministry of Environment of Japan and Musashino Cleaning Center in Tokyo, this paper focuses on the industrialization of domestic waste treatment in Japan, the management policies of domestic waste treatment, especially the revision direction of relevant policies. Therefore, it is proposed that (1) further improve the system of laws and regulations, and refine and improve the management measures of different types and different treatment methods of domestic garbage;(2) Effectively mobilize the enthusiasm of all parties and strengthen the construction of garbage disposal facilities in county-level areas through multiple channels;(3) Promote the integration of "production, education and research", and empower the technical bottleneck of domestic garbage treatment and the construction of ecological society with technology.

## 1. INTRODUCTION

In recent years, various regions and departments have vigorously promoted the construction of domestic waste incineration facilities. China's domestic waste incineration methods have been rapidly updated and iterated, and domestic waste incineration power generation related industries have been growing, and the municipal domestic waste incineration rate has increased significantly. Waste incineration facilities belong to the category of "Not in my backyard", which is necessary for society. However, due to various negative impacts such as environmental pollution to the surrounding environment and reduction of property value, local residents often avoid them.

The concept of "neighborhood avoidance" originated in 1970s, and foreign scholars found a typical event [1] in the study of mass resistance events caused by environmental problems. The neighborhood avoidance problem specifically refers to the public opposition caused by the facilities that "can bring overall social benefits to the surrounding areas and contribute to social development, but will have negative external effects on the surrounding residents" and intensify into mass conflicts [2].

Japan has rich experience in domestic waste treatment and comprehensive management, and is at the forefront of other countries. Using circular economy model in domestic garbage treatment has formed a certain scale, and has become one of the countries with the earliest start and the highest level of developing

circular economy in the world. Because Japan has an efficient domestic waste energy conversion system, advanced biological treatment methods of organic waste and relatively high-quality source domestic waste classification, it has achieved a higher recycling rate of domestic waste.

## 2. BASIC SITUATION OF DOMESTIC GARBAGE TREATMENT MECHANISM IN JAPAN

With the development of economy and society, like other countries, domestic waste treatment in Japan has gone through a process of solving puzzles. In order to slow down the generation of domestic garbage and improve the efficiency of recycling and resource utilization of domestic garbage, Japan timely adjusted the concept and measures of domestic garbage treatment, implemented the classified collection and management of urban domestic garbage, and built a scientific, systematic and complete garbage classification management system with the ultimate goal of recycling and reusing domestic garbage. This domestic garbage treatment system is well designed and efficient, and has achieved good results in Japan.

The enactment of the Special Measures for Dioxins Act of 1999 and the efforts of municipalities to establish stringent emission standards and to make waste incineration facilities as environmentally friendly as possible have also contributed to this trend [3].In

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addition, a questionnaire survey of residents near Shanhe Waste Treatment Plant, which was violently opposed in the past, showed that more than 70% of the residents had a good impression of the plant [4]. This is because residents are involved in the planning, construction, management and operation of Shanhe Waste Treatment Plant. This was attributed to the establishment, with the participation of the local population, of a council responsible for the planning, construction, management and operation of the municipal solid waste treatment plant and the promotion of the substantive participation of the local population in the planning and operation of the plant. As a safe and reliable facility, waste incineration plant has gradually won people's trust.

On March 26, 2019, the Ministry of Environment of Japan announced the total amount of garbage discharged and treated in Japan as of 2017. According to the survey results, since 2000, the total amount of garbage in Japan has dropped significantly, and the downward trend has eased after 2011. As of 2017, the total amount of garbage in Japan reached 42.89 million tons, a decrease of 0.6% compared with 2016. Per capita daily garbage emissions have been reduced by 0.5%. The final garbage treatment capacity is about 40.85 million tons, which is 3% less than that in 2016. Among them, the total amount of garbage treated by incineration, crushing and sorting is 38.49 million tons, and the recovery capacity is 1.94 million tons, accounting for 99% of the garbage treatment capacity [5].

In 2021, the number of waste incineration facilities in Japan was 1,067, and the number of facilities showed a downward trend [6]. On the other hand, the processing capacity of each facility is on the rise as a result of consolidation and phase-out plans aimed at large-scale expansion and facility intensification. The service life of waste incineration facilities is generally 20 years, but 46% of waste incineration facilities have a service life of more than 25 years, and the waste incineration facilities in Japan are aging rapidly. In the future, it is expected that waste incineration facilities in many parts of the country will need to be updated. In addition, the total amount of waste discharged and disposed of is declining at present, and with the increasingly difficult financial situation of Japanese municipal authorities, it is necessary to establish a stable and efficient waste disposal system through appropriate expansion and strengthening facilities.

### **3. BRIEF INTRODUCTION OF DOMESTIC WASTE MANAGEMENT POLICY IN JAPAN**

In 2000, Japan enacted the Basic Law for the Formation of Circular Society (Circular Basic Law), aiming at getting rid of the economic system of large-scale production, large-scale consumption and large-scale abandonment and promoting the construction of a circular society ensuring 3R (Reduce, Reuse, Recycle). The Basic Plan for Promoting the Formation of a Circular Society (Circular Basic Plan) formulated in this Law clearly puts forward the digital targets of

resource productivity (import), recycling utilization rate (recycling) and final treatment capacity (export), which promotes the all-round development of a circular society [7].

#### **3.1. Multi-value Waste Treatment Facilities**

According to Article 5, paragraph 3, of the Waste Treatment and Cleaning Law, the Ministry of the Environment of Japan formulates the Waste Treatment Facilities Development Plan (hereinafter referred to as the "Ministry of the Environment Facilities Development Plan") every five years, aiming at systematically implementing waste treatment facilities development projects. In the plan from 2018 to 2022, in addition to properly handling and strengthening the response to climate change and disasters, it also emphasizes the development of waste treatment facilities that create new value for society [8]. In March 2021, the Ministry of the Environment issued the Guidelines on Promoting the Development of Waste Treatment Facilities for Creating Multiple Values. Waste treatment facilities that create multiple values mean that besides waste treatment functions, they also have independent and decentralized functions such as energy supply base, disaster prevention base, resource recycling base and environmental learning base, and make contributions to improving regional attractiveness and solving regional problems by combining these functions with urban development factors [9]. The multi-value of garbage disposal facilities can produce regional decarbonization, create employment opportunities, promote local circular economy and improve residents' services, while maintaining proper garbage disposal. In this way, the idea of comprehensively solving multiple problems in the region at the same time is highly consistent with the concept of sustainable development goals.

#### **3.2. Multiple Value Creation Considerations and Initiatives**

The Facility Development Plan and Facility Development Promotion Guide of Japan's Ministry of Environment summarize the value changes brought by waste incineration facilities to the region. The main traditional measures of waste incineration facilities are (1) waste incineration for the purpose of protecting the living environment and improving public health, and (2) providing heat and electricity to surrounding facilities from the perspective of reducing greenhouse gas emissions and improving public services. In addition to these initiatives, the following will be added: the production of energy for local consumption, the reduction of operating costs through electricity sales revenue, the opening of well-equipped environmental publicity facilities to residents, the implementation of various environmental learning programs, the stable incineration of garbage in the event of disasters, the provision of heat and electricity to public facilities with shelter functions in the event of disasters, and the

support of disaster prevention bases through the provision of heat and electricity.

The following are some examples of support provided to disaster prevention centers: stable incineration of garbage during disasters, provision of heat and electricity to public facilities with shelter functions, provision of heat and electricity to local industrial facilities, carbon recycling through the introduction of carbon dioxide recovery and recycling equipment, and creation of new disaster prevention centers. Implementing carbon cycling through the introduction of carbon dioxide recovery and recycling equipment and creating new industries through these initiatives will bring the following values to the region: stabilizing energy supply, strengthening local education, revitalizing local communities, improving public health in the face of disasters, realizing safe and reliable disaster-resistant lifestyles, developing local industries, revitalizing local economies and building a low-carbon society.

### **3.3. Multiple Value Creation Considerations and Initiatives**

The Ministry of the Environment's Guide to Facility Development mentions the need for more extensive research than traditional facility development in the development of waste treatment facilities that can create multiple values and contribute to the creation of regional cyclic symbiosis zones [10]. Specifically, it is necessary to grasp the characteristics, actual conditions and needs of the region from the urban development planning or higher-level planning. Find out the functions that can be provided by garbage disposal facilities suitable for the region, and concretize them through coordination with relevant parties in various fields. These processes cannot be carried out by departments responsible for planning and facility development, such as municipalities, but require cross-sectoral cooperation and high-level management decisions in the industrial field. In the process of carrying out various studies, such as understanding local characteristics, actual conditions and needs, and coordinating with relevant parties in various fields, it is necessary to greatly change the ways and methods of public participation implemented in the field of waste treatment facilities development in the past. The role of the project should not only be "the field to solve residents' doubts", but also "the field where the project operators and the public think together about the waste incineration facilities creating multiple values for the region and realizing this value".

## **4. ENLIGHTENMENT AND REFERENCE TO CHINA'S GARBAGE DISPOSAL MECHANISM**

### **4.1. Further improve the system of laws and regulations, and refine and improve the management measures of different types and different treatment methods of domestic garbage**

Japan has a relatively perfect system of laws and regulations on domestic waste treatment and management, from Waste Treatment Law to Food Recycling Law, Basic Law on the Formation of Circular Society and Promotion Law on the Utilization of Resources, all of which are laws formulated by Japanese government departments to meet the needs of domestic waste management in different periods. So as to effectively promote the establishment of the concept of "waste should be a kind of resource", which is conducive to the closed recycling of domestic garbage. Japan's perfect laws and regulations for domestic waste enlighten China to legislate first when carrying out domestic waste treatment. China formulated the Opinions on Innovating and Perfecting the Price Mechanism for Promoting Green Development in 2018, the Law on Prevention and Control of Environmental Pollution by Solid Waste in 2020, the Guiding Opinions of the State Council on Accelerating the Establishment and Perfection of a Green and Low-carbon Circular Development Economic System in 2021, and the Ministry of Housing and Urban-Rural Development and other departments issued the Opinions on Further Strengthening the Treatment of Municipal Domestic Waste. The recent promulgation of a series of laws, regulations and policies in China has created a good legal environment for the implementation of domestic garbage disposal charges in China. The classification of domestic waste in China has made progress in stages. At present, domestic waste classification in 46 key cities, such as municipalities directly under the Central Government, provincial capitals, cities with separate plans and the first batch of pilot cities for waste classification, covers more than 77 million families, with a coverage rate of 86.6% in residential quarters. Domestic waste classification in other prefecture-level cities has been fully started. The kitchen waste treatment capacity of 46 key cities has increased from 34,700 tons per day in 2019 to 62,800 tons per day at present, and the average recycling rate of domestic waste is 30.4%, with 15 cities reaching or exceeding 35% [11]. In the next step, on the basis of these laws and regulations, it is necessary to further refine and improve the management measures and implementation regulations of different types and different treatment methods of domestic garbage, so as to escort the legal treatment of domestic garbage.

#### **4.2. Effectively mobilize the enthusiasm of all parties and strengthen the construction of garbage disposal facilities in county-level areas through multiple channels**

In the process of implementing the policy of garbage classification and recycling, Japan has adopted a variety of different economic tools, which has effectively mobilized the enthusiasm of all parties. The implementation of these policies provides a powerful reference for China to adopt practical management policies from production, use to recycling, so as to play the regulatory role of the market under the guidance of the government. Therefore, when adjusting and perfecting the domestic waste management system in China, we should actively learn from the idea of circular economy as the core, focus on establishing and perfecting a green and low-carbon circular economy system, and actively play the role of market incentives and constraints. At the production level, vigorously promote the number of packaging uses, strengthen the design of ecological products and strengthen recycling; At the consumption level, educate and guide consumers to avoid waste and garbage, restrict the use of plastics and choose ecological products. Through the implementation of a series of policies, we should make a good combination of policies, and give full play to the price mechanism and supply and demand mechanism in slowing down the generation of domestic garbage and improving the recycling of domestic garbage. Set out to establish the responsibility of production units, strengthen production units to increase investment in domestic garbage recovery and treatment, improve resource utilization, realize internalization of garbage treatment cost, slow down the generation of domestic garbage and realize source control.

#### **4.3. Promote the integration of "production, education and research", and empower the technical bottleneck of domestic garbage treatment and the construction of an ecological society with technology**

Using the integrated operation mode of "production, education and research", linking the resources of government, enterprises, universities and other parties, we can promote the rapid landing of the latest technology from the perspective of power circular economy. At the same time, taking the intellectual strength and intellectual support of colleges and universities as an important lift, we scientifically judge the rationality of matching the amount of domestic garbage generated in prefecture-level cities with the planning of waste incineration power generation projects, and make overall plans for the system and process of transporting domestic garbage across cities, districts and counties. Experts in the industry pointed out that there are still bottlenecks in waste treatment technology, especially the kitchen waste treatment has not found a solution with high resource utilization degree, low economic cost and popularization value. Liu Jianguo, a professor at Tsinghua University, suggested that a

hierarchical structure of kitchen waste reduction and recycling should be established, diversified treatment should be adopted, large-scale centralized biological treatment should be given priority, fine management at the source should reduce food waste, and explicit hidden benefits should promote high-quality development of the industry [12].

## **5. CONCLUSION**

Through combing and analysis, this paper draws the following conclusions: (1) Further improve the management methods of different domestic garbage disposal methods; (2) Try to adopt a variety of different economic tools to mobilize the enthusiasm of all parties; (3) Continuously strengthen the fine management level of garbage disposal enterprises. In addition, in the future, we can actively consider the linkage possibility between garbage disposal mechanism and stabilizing energy supply, strengthening local education, reducing disasters, revitalizing local economy and building a low-carbon society.

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